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MALE BAY-BREASTED WARBLER ARRIVING AT NEST



FEMALE REMOVING A FECAL SAC



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### NESTING OF THE BAY-BREASTED WARBLER

BY HOWARD L. MENDALL

*Plates 25, 26*

IN most of the publications dealing with the avifauna of eastern United States, the Bay-breasted Warbler (*Dendroica castanea*) is considered a rare or at least an uncommon bird. Frequenting the coniferous forests of the Canadian Zone, it breeds within this country in only a few of the most northerly States in limited numbers. Maynard (1872) found it the most abundant warbler at Lake Umbagog, New Hampshire, but this appears to have been an exceptional and local concentration. The inauspicious musical talents of the Bay-breasted Warbler, its fondness for dense tracts of young conifers, and its tendency to feed primarily among the middle and upper branches of such trees, have placed the bird somewhat beyond the limits of accessible study. Consequently, papers dealing with specific or detailed observations of its habits have been few. In Maine, I have found this species most commonly near the coast in regions where thick growths of spruce and fir have succeeded birches and aspens and where a few of these hardwoods still remain scattered among the conifers. I have seldom observed the bird in the interior of the State, although in Androscoggin County, from 1924 to 1932, a few individuals were regularly noted during their migrations. Here, where spruces are not as plentiful as they are in the northern and eastern sections of Maine, the birds showed a preference for mixed growths consisting of birches, maples, firs and pines.

In the summer of 1936, I found a nest of the Bay-breasted Warbler at South Thomaston in Knox County, Maine. An opportunity for study was afforded and the observations that were made, are here presented. South Thomaston is a coastal town, located a few miles southwest of Rockland, and is situated in the lower Canadian Zone. For the past three summers, I have made numerous observations in the wooded sections of this region and have found the Bay-breasted Warbler only rarely. None was seen

here in 1934. A male was noticed three or four times during June and July in 1935 but no evidences of breeding were noted. No birds were observed in 1936 other than the pair with which this paper deals. During the fall migrations, 1933-1936, I have never seen Bay-breasted Warblers in this section of the State although I have observed them rather frequently in the coastal counties of Washington and Hancock. Knight (1908) knew of no breeding records for Knox County and stated that the species was rare in summer.

The South Thomaston nest was discovered on June 12, 1936. It was situated on a horizontal branch of a fir tree twelve feet above the ground, five feet from the trunk of the tree and one foot from the end of the branch. The foliage around the nest was thick, and a few pieces of grass, seen from below, were the only evidences that betrayed the home. The nest was large but compact, and was constructed externally of small spruce and fir twigs and dried grass, lined with fine grass, black rootlets and moss setae, the last identified by Mr. Arthur H. Norton, of the Portland Museum of Natural History, as probably those of the haircap, *Polytrichum commune*. Two nests found in Hancock County, Maine, and described by Stanwood (1909), were similarly constructed except that they were lined with cinquefoil runners, pine needles and hair.

The following measurements of the 1936 nest were obtained after the young had left: outside depth, 2 inches; inside depth,  $1\frac{1}{2}$  inches; outside diameters, 4 and  $3\frac{1}{2}$  inches; inside diameter,  $2\frac{1}{4}$  inches. These figures are interesting when compared with those of other observers. Data from one of Stanwood's nests, also measured after the young had departed are: outside depth, 2 inches; inside depth,  $1\frac{1}{4}$  inches; outside diameters,  $4\frac{1}{2}$  and  $3\frac{1}{2}$  inches; inside diameter,  $2\frac{1}{2}$  inches. Philipp and Bowdish (1917) present measurements of three nests from northern New Brunswick, and the averages of these figures follow: outside depth,  $2\frac{1}{3}$  inches; inside depth,  $1\frac{1}{3}$  inches; outside diameter,  $3\frac{4}{5}$  inches; inside diameter,  $2\frac{1}{10}$  inches. Apparently these nests were measured at the time they were found and when they contained fresh or slightly incubated eggs. Maynard describes three nests from Lake Umbagog, New Hampshire, that also appear to have been measured when discovered. The average dimensions are: outside depth,  $2\frac{3}{4}$  inches; inside depth,  $1\frac{1}{2}$  inches; outside diameter,  $5\frac{2}{3}$  inches; inside diameter,  $2\frac{2}{3}$  inches.

The nesting tree, selected by the birds at South Thomaston, was beside a road leading from the ocean through a quarter-mile stretch of woodland to the main highway. South of the road, and on the side where the nest was located, is a dense tract of second-growth woods consisting chiefly of spruce and fir. The interior of this area is made up of medium-sized timber and is heavily populated with red squirrels. On the north side of the road,

there exists swampy pasture land and a cut-over tract that is growing rather thickly to spruce, fir, larch, birch and maple. This area is the breeding haunt of many birds typical of the Canadian Zone, the most abundant of which are the Magnolia Warbler, Black-throated Green Warbler, Olive-backed Thrush, White-throated Sparrow and Slate-colored Junco.

At the time the nest was discovered (4 p. m., E. S. T., on June 12), the female was incubating. She was reluctant to leave the nest, even when I had climbed within three feet of her, and it was not until the branches had been pulled to one side that she departed. Injury-feigning was very much in evidence. The bird dropped to a lower limb of the tree and almost literally crawled through the foliage in front of me. The left wing was extended and drooped, the tail was twisted to the left and the feathers spread. The bird uttered no sound, but continued to move through the branches for about fifty seconds after which she flew around me, several times coming very close to my head, and scolded violently. This protest brought the male to the scene and he joined his mate in uttering notes of alarm, although with less vigor. Incidentally, the female expressed injury-feigning on most of the subsequent occasions that she was disturbed while incubating, but did not do so after the eggs had hatched. The male did not always appear in response to his mate's calls and never showed serious concern when in the presence of a human intruder.

The nest contained four eggs when found, but a fifth one was laid the following day some time prior to 9 a. m. At this hour, the female was again incubating and the male was singing from the top of a nearby spruce. As the female left the nest, the male flew toward her, uttered two or three calls of alarm and then flew into a thick clump of spruces where he began to feed. Once he joined his scolding mate for a moment, but promptly resumed his search for food.

There was no opportunity for photography with the nest in its original position, but I decided to forego any experiments in moving it until a later period in the birds' home-life. A few twigs were cut to afford a better view from beneath and this was the extent of any immediate alteration in the natural surroundings. The nest was visited, however, several times daily throughout the period of incubation and observations were made. After having ascertained that five eggs completed the set, I did not disturb the incubating bird until June 21 when I felt that the period of incubation was drawing to a close. From this day on, the adult was forced from the nest at least twice each day until all the young were hatched. At no time during the incubation period was the male seen on the nest. On occasions when the female was absent, her mate remained on guard close to the nest although not on it. At times, while I watched from the ground, the male

brought food to the incubating female; the birds apparently were undisturbed by my presence. The foregoing observations are similar to those of Stanwood who states that incubation is wholly by the female and that she is frequently fed on the nest by the male.

On June 21, the first attempt was made toward moving the nest into position where it could be readily observed and photographed from a blind. In view of the fact that the eggs had not hatched, and that consequently there was more possibility of desertion by the parents, I determined to conduct such maneuvers in a series, with only slight changes at a time, since a considerable move would be necessary before the nest could be located in front of a blind. The initial change consisted merely in cutting off the nesting limb in such a manner that the nest could be moved about three feet nearer the trunk of the tree. The limb was securely fastened to a higher branch in order to prevent possible drop or unnecessary shaking during the sawing. Throughout this procedure, which required at least fifteen minutes, the female remained on the nest although I nearly touched her at times. She followed the movements of my hands by twisting her head but otherwise showed little uneasiness. It was not until the limb was entirely cut and I started to move it back toward the trunk that she left. Injury-feigning was not practised but the bird scolded and flew around my head a great deal. The male, with a beak-full of caterpillars, put in a belated appearance while I was making the nesting limb secure in its new position. The female stopped scolding as soon as I reached the ground and flew across the road into the top of a group of spruces to feed. She returned in about three minutes and immediately went on to the nest, where she arranged the eggs and commenced to incubate. She appeared to accept the new location without trepidation.

When the nest was approached at 7 o'clock on the morning of June 23, the female was incubating. None of the eggs had started to hatch. The male, singing in a nearby spruce, was not visible at first but soon flew out of a thick clump of foliage about two-thirds of the way up the tree and at a point about 25 feet above the ground. It was noted throughout the duration of the study that this tree was selected for singing more often than any other, although there appeared to be no clearly defined 'singing tree.' At 4 p. m., on the same day, it was found that two eggs had hatched. Apparently this process had taken place about noon since the natal down was perfectly dry. The eggshells had been removed. It was interesting to note that one of the young gave the food response twice when I brushed against the twigs supporting the nest.

At this time, the second shift in the nesting limb was made, a move that brought it at a right angle to its former position. Both adults scolded considerably while I was getting the branches in place and the female flew

very near, once alighting on the edge of the nest for an instant. After descending from the tree, I retired to the opposite side of the road and concealed myself. The male continued to call at intervals from the top of the nesting tree. His mate, still scolding, flew back and forth between the nest and the stub where the nesting limb had previously been attached. She appeared to have difficulty in orienting herself and several times hovered over the space formerly occupied by the nest. Gradually, however, she became less agitated and after about fifteen minutes she alighted on the edge of the nest. She remained only a moment and then, followed by the male, flew across the road into the pasture. Five minutes later she returned and immediately settled down on the nest, as though it had not been tampered with. Shortly after 5 o'clock, I again visited the site and was gratified to observe the female incubating and brooding. As I watched, the male flew into the tree with a small green caterpillar or other insect. He hopped from limb to limb until he arrived at the nest and perched on its rim. The female had partially arisen and she took the food from her mate. I believe she gave it to one of the young but could not be sure of this because of my distance from the nest.

On the morning of the 24th, at 9 o'clock, the male flew out of the nesting tree as I approached. In about a minute, the female appeared, flying across the road from a mixed clump of gray birches and young firs. She was carrying food which she gave to one of the young upon arriving at the nest. Leaving the nest shortly, she flew into the pasture and a fragment of an eggshell was plainly visible in her beak as she passed me. Upon examination, it was found that a third egg had hatched, and the down on the nestling was still somewhat moist. Each of the other young gave the food response at my approach. At 2.30 p. m., there was no indication that either of the other eggs was about to hatch, but at 5.30 o'clock a fourth nestling was present with down partly dry. Remains of the shell had been removed.

The next change in the nest location was made at 3 o'clock on the afternoon of June 25. At this time the fifth egg had not hatched. The nest was moved at a right angle to its last position (it was now on the south side of the tree exactly opposite its original location) and lowered about four feet. The adults acted in very much the same manner as they had previously done, scolding for several minutes and making repeated trips to the former location. Nevertheless, within ten or fifteen minutes, they had become a part of the new environment. At 7.30 o'clock in the evening, the site was again visited and the female was forced from the nest. The fifth egg had hatched recently, for the down on the nestling was still wet and the eggshell had not been removed. None of the young gave the food response nor did they show any perceptible reaction when the beam of a flashlight was focused on them for a moment.

A blind was set up near the nesting tree on June 26 but, due to adverse weather conditions, no observations were made until the 28th. On this date, I spent slightly more than one hour, from 7.50 a. m. to 9 a. m., in the blind. The adults were somewhat wary at first; they did not scold very much but hovered over the nest and flew about the blind for several minutes. At 7.58 a. m., however, the female alighted on the nest and adjusted one of the moss fragments that constituted the lining. Apparently satisfying herself that the nestlings were safe, she flew to the top of a spruce and commenced to search for food. At 8.01 a. m., the male arrived with a small worm which he gave to one of the young. A few seconds later, the female, also carrying food, alighted on the nesting limb and hopped on to the nest. After the feeding process, both adults remained at the nest for a moment. Then the female seized a fecal sac and flew across the road. The male preened the feathers of his breast and flew about thirty feet to a gray birch where he began to sing. During the hour from 8 to 9 a. m., the male made seven trips to the nest, feeding eleven times, eating one fecal sac and carrying one away. Meanwhile, the female was making 19 trips to the nest, feeding 23 times, eating two fecal sacs and carrying away three. On three occasions, both parents were on the nest at the same time, and once the male passed his food to the female which, in turn, gave it to the young. From 8.41 to 8.48 a. m., the female brooded the nestlings but was unattended by the male during this period.

The fourth and final change in the nest was made on the morning of June 29, and this was the most extensive alteration of all. The nest was moved about ten feet to another tree and lowered until it was but four feet from the ground. The blind also was relocated, being set up about four feet from the nest. The adults made some disturbance during these operations but went about their usual activities as soon as I had withdrawn to the road. I attempted no detailed observations until afternoon, entering the blind at 12.58 p. m. Both parents scolded a little and the female flew back and forth between the nest and the blind. Two of the young had their eyes open and all of them were quite active, frequently giving the food response as the female passed over their heads. At 1.05 p. m., the male flew down from a small spruce, where he had been calling from a perch, and hovered over the nest but did not alight. The female had stopped scolding by this time and at 1.06 p. m. she arrived at the nesting limb and hopped to the nest. She brought a large gray moth which she offered to one young but, when the food was not swallowed, withdrew it and gave it to one of the other nestlings. After this visit, she showed no further fear of the blind and made regular trips to the nest. During the two and a half hours of observation, she brought food to the young 39 times, although on only four occasions did she feed more than one young at a visit. Eight fecal sacs were disposed

of, seven of which were carried away. The male did not take part in caring for the young until 2.21 p. m., and even after that he interspersed his parental duties with frequent periods of song. However, he usually brought more food at a time than did his mate and also was more likely to feed two or three young at a visit. Altogether, he made 24 feedings during 17 trips to the nest, ate three fecal sacs and carried away four. He was often at the nest with his mate and three times gave her the food for the young.

On this afternoon, I had a good opportunity to observe the behavior of the birds during inclement weather, since a brief but severe thundershower occurred. At 2.10 p. m., the first peal of thunder was heard. By 2.25, it was quite dark in the woods and the wind had freshened noticeably. Up to this time the birds had continued their normal routine, but it was noted that the female, in the process of removing a fecal sac, raised her head suddenly at a very sharp flash of lightning. By 2.27, it was apparent that the squall was about to break. The wind had completely died down and the air was exceedingly oppressive. The female warbler arrived, fed two young, ate one fecal sac and then remained on the nest facing the approaching storm. At 2.30 p. m., the male appeared, passed a moth to the female—which she gave to one of the young—and then flew away, leaving his mate on the nest. Shortly, the oncoming wind could be heard in the distant treetops. As the first blast struck, the nesting tree swayed violently and the adult departed, flying across the road. The rain followed immediately to the accompaniment of severe thunder and lightning. The female returned in a moment and stood on the nest shielding the young. The rain increased steadily and, after a few minutes, the bird crouched in the nest with wings drooped over the sides. She was still in this position when I left the blind at 2.38 and she showed no fear when I went past the nest. I re-entered the blind at 2.57 p. m., just as the rain was ceasing and the bird was then standing on the edge of the nest with one wing partially drooped over the young. The male did not appear to be nearby and he did not come around until 3.09 p. m.

On June 30, the nest was under observation from 9 to 11 a. m. The young were very active, especially the two largest ones which were now seven days old. These latter engaged in frequent though short periods of wing-flapping and made feeble efforts to stand erect. Even the smallest nestling, which was but five days of age, managed to keep from being submerged under the pack, although it usually was forced to wait for food until the immediate needs of its nestmates were attended to. The parents fed the young 70 times during the observation period, making 57 trips to the nest with food. Twelve fecal sacs were disposed of: six were eaten and six carried away. As was the case previously, the female averaged nearly three trips to the nest to each visit of the male.

The morning of July 1 was very hot, and from 10.30 until 11 a. m., the sun beat relentlessly down upon the nest. During this period, the male took part in the feeding process somewhat more than usual and the female devoted considerable time to shading the young. This was definitely not an act of brooding for the bird simply stood on the edge of the nest in such a manner that a shadow fell across the young birds. The afternoon was much cooler and, although the nest was exposed to the sun part of the time, neither shading nor brooding was noticed. The young birds were very active during the middle of the afternoon, climbing over one another and snapping at wings and necks. The two oldest ones were able to stand erect for a few seconds at a time. During a three-hour period on this day, the male fed 38 times, making 26 trips to the nest to do so. He ate three fecal sacs and carried away four. His mate made 79 feedings during 68 visits. She carried away seven fecal sacs and swallowed eight others.

On the morning of July 2, it was again hot and the female shaded the young much of the time between 10 and 11.30, although she left the nest for two or three minutes at a time in search of food. Once more the male did extra nesting duty during this time. The young exercised and played with one another considerably during the cooler part of the forenoon but were very quiet from 10.40 a. m., until about noon. Shortly after 7 o'clock in the evening, I visited the blind without disturbing the brooding female. The male, bringing food, arrived at the nest at 7.25. His mate stood up to greet him, and to eat a large moth that he had brought. None of the young appeared to be awake, and the female soon settled back on the nest.

It was evident, on July 3, that the two oldest young were nearly ready to leave the nest. They were both well feathered out and one of them showed some fear of me as I stood beside the nest. This was the first time this instinct had been noted. Between 7.30 and 10.45 a. m., the hours of observation, both of these nestlings climbed up on the edge of the nest several times, and they engaged in frequent periods of wing-flapping. The weather was clear and cool with a slight northwesterly breeze and there was no need for brooding or shading. The male fed 33 times during 24 trips to the nest in a three-hour period, and the female made 63 visits, feeding 69 times. Twenty-four fecal sacs were removed by the parents, 19 of which were carried away.

On a brief visit to the nest shortly before 8 o'clock on the morning of July 4, one of the oldest young was perched in the original nesting tree about twelve feet from the ground. The other eleven-day-old bird was on a small branch about a foot from the nest. At my approach, it flew into a birch, fifteen feet away, alighting somewhat heavily. The two nestlings which were ten days of age showed fear of me, although neither made any attempt at flight.



FEMALE BAY-BREASTED WARBLER FEEDING YOUNG



FEMALE BAY-BREASTED WARBLER SHADING YOUNG



Returning at 9.15 a. m., I knew that something was amiss even before I had reached the immediate vicinity of the blind, for both adults could be heard scolding. The chattering of a red squirrel signified the reason for the disturbance, and shortly the mammal ran across the road, carrying one of the young warblers. Another nestling lay dead under the tree. It had a severe neck wound and a scratch along the lower abdomen. One young still remained in the nest and appeared to be uninjured. This bird was one of those which had hatched on June 24 and was now ten days old.

The nest and its lone occupant were under observation from 9.17 to 11.05 a. m. During the first few minutes, the adults showed no interest in the nest as they flew among the trees, scolding. The female made numerous trips to a thick patch of small spruces and gray birches about 25 yards away where, as later investigation showed, the two oldest young were located. At 9.25 a. m., she came to the nest and fed the bird there. Following this act, she flew across the road and did not visit the nest for half an hour. However, she spent a great deal of time near the young which had left the nest safely, and she carried food to them. One of these birds could be seen perched on top of a spruce about five feet high, but the other apparently was at a lower elevation and was invisible from the blind. At 10.05 a. m., the female again came to the nest but remained only long enough to eat a fecal sac. She did not feed the bird and did not return to the nest until 10.31. This time, as well, no feeding took place, and it was not until 11.03 that she finally brought food to the nestling. She scolded somewhat from time to time although there seemed to be no enemy near and, when not feeding the two oldest young, flew rapidly from tree to tree. The male, despite his mate's somewhat abnormal behavior, showed no distraction whatsoever. He attended to his domestic duties faithfully and did considerably more than his usual share of this work. He fed the nestling ten times and made seven trips with food to the trees where the two other young were located. He varied the feeding activities with occasional brief periods of song. At 8.30 p. m., on this same date, the last remaining young had disappeared. In all probability the squirrel returned to the scene of its earlier depredation, since I do not believe the nestling would have left voluntarily for at least another day.

On the morning of July 6, the male was singing in the original nesting tree and one of the young was perched on a low branch of the same tree. Again on July 12, both adults and one of the young were found, still in the vicinity of the nest. The male was feeding and singing near the top of a tall tree. This was the last date on which any of the birds was observed.

The incubation period was measured accurately only in the case of the fifth egg laid and it proved to be slightly over twelve days. The fact that more than fifty hours elapsed between the hatching of the first and the

last egg, and the fact that all of the eggs hatched at quite regular intervals would indicate that incubation commenced during the early part of the laying period.

The two oldest young left the nest when they were eleven days of age. Stanwood found that in a nest of five young, two departed when ten days of age and three left on the eleventh day. Forbush (1929) says that the young leave the nest in about ten days.

One very interesting point observed during the study was the relationship between the male and the female when they were together on the nest. This occurred fairly often, and almost invariably at such times, the female would tremble and droop her wings, fluttering them slightly but rapidly. No emotional response on the part of the male was noticed although he frequently passed his mate food following the act.

#### SUMMARY

During the breeding season, the Bay-breasted Warbler appears to show a decided preference for fairly dense coniferous growths. The male usually sings near the tops of such growths and much of the food is gathered in the thick upper branches.

The period of incubation was observed to be slightly over twelve days, and the eggs hatched at intervals, with more than two days between the hatching of the first and the fifth egg. Two young left the nest at eleven days of age.

Incubation and brooding apparently are carried out solely by the female, which is, at least part of the time, fed on the nest by the male.

Injury-feigning was commonly observed when the female was flushed while incubating.

During the observation periods from June 28 to July 3 (when there were five young in the nest), the female averaged 26.4 feedings per hour, while the male fed on the average 13 times an hour. However, under certain conditions and for short periods of time, the male performed a much greater proportion of the nesting duties.

Both adults and one of the young were still together in the vicinity of the nest eight days after the home had been forsaken.

The adult birds showed a remarkable degree of adaptability in the face of the four changes in location to which the nest was subjected. In fact, for a species of the woodlands, the Bay-breasted Warbler appears to be exceedingly tame and unsuspicious in the presence of man.

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## THE GREATER SNOW GOOSE IN CANADA

BY E. F. G. WHITE AND HARRISON F. LEWIS

THE late C. E. Dionne published in his work, 'Les Oiseaux du Canada' (1883), the fact that the Greater Snow Goose (*Chen hyperborea atlantica*) occurs in flocks of considerable size at migration time at certain places on the tidal flats of the St. Lawrence River near Quebec City. In his 'Catalogue des Oiseaux de la Province de Quebec' (1889) the abundance of the species in that vicinity received greater emphasis, for he there states that this goose is "very common" on the river flats at migration time. Finally, in his crowning work, 'Les Oiseaux de la Province de Quebec' (1906), Dionne gave additional detail in a statement that may be translated freely as follows: "The Greater Snow Goose is very common and often occurs in flocks of considerable size in spring and fall at certain places on our river flats, especially at St. Joachim, where I have seen flocks containing from three to four thousand individuals, on the Island of Orleans, and as far as the Seal Islets. When migrating, the flocks of this species are not infrequently seen passing quite close to this city [Quebec]." He also mentions that he had obtained several autumn specimens from St. Joachim, which is on the north shore of the estuary of the St. Lawrence River, about twenty-five miles northeast of Quebec.

Greater Snow Geese are now known to be present each year at St. Joachim and vicinity from the first of April, or even the last of March, to about the 20th of May, and again in the autumn from about September 12 till freeze-up, which may occur at any time between November 15 and 30. How long they have thus made this area a regular resting and feeding place on migration is uncertain, but Mr. Henry des Rivières, of Quebec, who is intimately acquainted with these birds as they occur locally, states that they first began to visit the area in small numbers about sixty-five years ago. About thirty-five years ago the maximum number of Greater Snow Geese to be found at St. Joachim was between 2,000 and 3,000. Since then they have increased in numbers so that now there are at least 10,000 birds in the flock, which probably includes all the Greater Snow Geese in existence. The area at St. Joachim on which they spend most of their time while in that region is a preserve belonging to the Cap Tourmente Fish and Game Club. The Greater Snow Geese, while on this preserve, are protected by both the Royal Canadian Mounted Police and the warden of the Club, with the result that they enjoy practically complete protection during their spring sojourn, and the hunting of them that takes place in autumn is limited and carefully controlled. A few birds, of course, are taken outside

the preserve during the hunting season, but the total number of Greater Snow Geese killed annually on the entire St. Lawrence River area frequented by them is less than four hundred.

It is chiefly during the spring migration, when the flocks of Greater Snow Geese are arriving from the south, that they are seen passing Quebec City. These spring flocks are rather large, in noticeable contrast with the numerous small flocks in which the birds come from the north in the autumn. In May, as the time to leave St. Joachim for the north approaches, the Greater Snow Geese are observed to be unusually restless, flying a great deal, and frequently circling while they rise to a great height, at least as high as the 1,800-foot summit of the rocky mass of Cap Tourmente. When they finally leave on their northward migration, in flocks often containing several hundred birds each, their route lies at first down the St. Lawrence River, where they pass at a moderate height. On May 19, 1932, at Murray Bay, on the north shore of the St. Lawrence about fifty miles below St. Joachim, the junior author saw a flock of about 150 Greater Snow Geese fly overhead at about seven o'clock on a fine, bright morning, heading northeastward along the north bank of the river, which is there about twelve miles wide. The geese were at an elevation of about 500 feet above the land immediately beneath them or about 750 feet above the river-level, and were flying in irregular formation and uttering frequent cries. Local residents who were questioned, said that it is usual to see these geese pass Murray Bay on migration in this way. Just where these birds leave the St. Lawrence and turn more directly northward is uncertain, but it is probably not very far beyond Murray Bay.

An indication of a more northern resting place on the spring migration route of the Greater Snow Geese is contained in a verbal report received indirectly by the junior author from Mr. Walter Giasson, a hunter and trapper, who resides at Seven Islands, Saguenay County, Quebec, but who, in May, is often at the headwaters of the Manikuagan River, a large stream, more than 260 miles long, that discharges into the St. Lawrence estuary from the north about 100 miles northeast of the mouth of the Saguenay. According to this statement, large numbers of Greater Snow Geese habitually stop in late May on the lakes at the headwaters of the Manikuagan, where Indians are accustomed to take some of them for food. The route of these geese from the headwaters of the Manikuagan to the Arctic islands is still largely a matter of conjecture.

Through the interest and kind cooperation of Major-General Sir James MacBrien, Commissioner, Royal Canadian Mounted Police, information concerning Greater Snow Geese in the Arctic was sought by the senior author, by means of questionnaires, from members of that Force who are or have been stationed in that region. The information in a number of

excellent replies<sup>1</sup> received in 1936 may be summarized as follows. In the vicinity of Pond Inlet, on the northeastern coast of Baffin Island, the date of first arrival of Greater Snow Geese varies, in different years, from the first week of May to the last week of that month. The first flocks to arrive usually contain only four or five birds each, but later flocks normally contain about twenty-five birds each. One flock of thirty-eight geese is reported as the largest single flock observed. Near Pond Inlet are two established nesting grounds of Greater Snow Geese, namely, one (the larger) on the southwest point of Bylot Island, facing Eclipse Sound, and one on the west bank of the Salmon River, about a mile and a half from Pond Inlet Detachment. Other nesting grounds farther from Pond Inlet are less definitely reported. A "nesting ground" is a level, poorly drained area, sometimes two or three miles in extent, over which the nests are usually widely scattered. From three to ten eggs in one nest are reported. Hatching generally takes place in the first half of July. Arctic foxes often eat the eggs and the goslings. The period when, because of the moult of the primaries, the adult geese are flightless, normally falls in the latter half of July or in early August. After the shallow lakes and streams are open, the geese obtain in them some of the vegetation on which they feed. Adults and young, travelling in company, generally leave the vicinity of Pond Inlet in the first half of September, on their southward journey.

At Craig Harbour Detachment, on the south coast of Ellesmere Island, not many Greater Snow Geese are seen, but an occasional flock, containing about twenty-five of these birds, passes that vicinity on migration in June. The nesting place of such Greater Snow Geese is not certainly known, but reports, apparently authentic, obtained from Eskimos, are to the effect that numbers of Greater Snow Geese nest about Lake Hazen, in northern Ellesmere Island, and in the vicinity of Stolz Peninsula and Mokka Fiord, in the eastern and southeastern parts of Axel Heiberg Island. No one now lives at these places.

That the breeding Snow Geese of northern Baffin Island and northward are Greater Snow Geese is corroborated by specimens in the collection of the National Museum of Canada. The northernmost specimen of Lesser Snow Goose (*Chen hyperborea hyperborea*) in that collection from the eastern Canadian Arctic is an adult (sex?) taken at Clyde River, on the east coast of Baffin Island, in the summer of 1927. The collection contains the following specimens of Greater Snow Goose (*C. h. atlantica*) from the eastern Canadian Arctic:

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<sup>1</sup> Replies have been furnished by the following members of the R. C. M. Police: Acting Sergeant H. Stallworthy, Corporal H. Kearney, Acting Lance Corporals R. C. Gray and R. W. Hamilton, and Constables L. A. Austin, J. W. Doyle, A. E. Fisher, A. Monro, and J. O. M. Wishart.

Cumberland Sound, Baffin Island, 1 adult female, "1929."

Clyde River, Baffin Island, 1 adult (sex?), "summer of 1927."

Pond Inlet, Baffin Island, 1 adult female, June 9, 1928; 1 adult female, June 10, 1928.

Bylot Island, 1 adult (sex?), "summer of 1927."

Eclipse Sound, Bylot Island, 2 heads, June 20, 1927.

Bylot Island or Navy Board Inlet, 3 adults (sex?), "summer of 1927."

Dundas Harbour, Devon Island, 1 adult male, June 22, 1928; 1 adult female, June 22, 1928. One egg was obtained with these two specimens and was sent to the National Museum with them.

Croker Bay, Devon Island, 1 adult male, June 22, 1928; 1 adult female, June 22, 1928.

Heads and other parts of geese examined by the senior author in 1934 at Pond Inlet, in the vicinity of which they had been taken, were identified as parts of Greater Snow Geese.

In the autumn migration the first of the Greater Snow Geese to reach the feeding and resting grounds at St. Joachim, Quebec, arrive there about September 12. Thereafter the birds continue to arrive gradually, in small flocks, for about a month, until all are present. On this autumn migration they are said to arrive at the Seal Islets, about twenty-five miles east of St. Joachim, some ten days before they are seen at the latter place. The first arrivals in the autumn are adults, and their numbers at St. Joachim are said to increase gradually to about 2,000 before any birds of the year are to be found with them. Whether or not these early-arriving adults are all or nearly all of one sex is not known. Later the birds often arrive in what appear to be family groups, which sometimes include two adults to the group, but often only one. After October 10, young birds form a majority of the assemblage.

When freeze-up causes the departure of these geese from St. Joachim in the autumn, they leave practically all together, generally by daylight, but sometimes at night.

The flat or muddy shore at St. Joachim on which the Greater Snow Geese feed, extends westward from Cap Tourmente for a distance of three or four miles. It is a tidal shore, on which the tide normally goes out for 200 yards or more. At a little distance from the shore is a sand-bar that is exposed only when the tide is low. The geese feed on the muddy shore during the rising and falling of the tide, as well as at high tide, but while the tide is down they generally betake themselves to the outlying sand-bar to rest and to obtain the supply of sand needed for digestion of their food. The food, while they are in this area, consists chiefly of the rootstocks and sprouts of a sedge, *Scirpus americanus* Pers., which grows on the muddy shore, but in the spring the geese sometimes have to resort to fields above the shore to obtain sufficient food. That the geese thrive on the food they obtain here is indicated by the fact that when they arrive at St. Joachim in the autumn

their average weight is between five and six pounds, but by the time when they depart southward their average weight has increased to about eight pounds. Occasionally some feeding is done at high tide in the night, but generally geese arrive on the feeding grounds shortly after daylight, coming from some small, low, rocky islands out in the river. They fly in any formation,—V's, lines, or bunches,—indiscriminately.

When the geese are feeding, there is practically always one large group of them at the eastern end of the muddy shore, close to Cap Tourmente, and often, but not always, another large group on the western end of the feeding ground. Small flocks fly back and forth between these large groups at frequent intervals, especially when the tide is rising, thus giving the hunters their opportunity. On windy days such small flocks may fly at a height of less than thirty feet. The birds of the year, lacking experience, are generally very tame, but the adult birds are very wary and, when live decoys were used, frequently recognized them as such and turned aside out of gunshot, trying by their calls to induce the young to do likewise.

It was on this muddy shore at St. Joachim that the regular annual field excursion of the American Ornithologists' Union viewed the main flock of Greater Snow Geese on October 21, 1932.

Sportsmen who have frequented the shore of St. Joachim regularly for many years report that conditions there are gradually changing. The shore appears to be higher than it was formerly, presumably because of deposition of silt. This change is having an unfavorable influence on the sedge preferred by the Greater Snow Geese, with the result that this plant is diminishing in abundance. If this process continues, this fine flock of geese will eventually have to seek other feeding grounds.

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NESTING HABITS OF THE SPOTTED SANDPIPER<sup>1</sup>

BY HENRY MOUSLEY

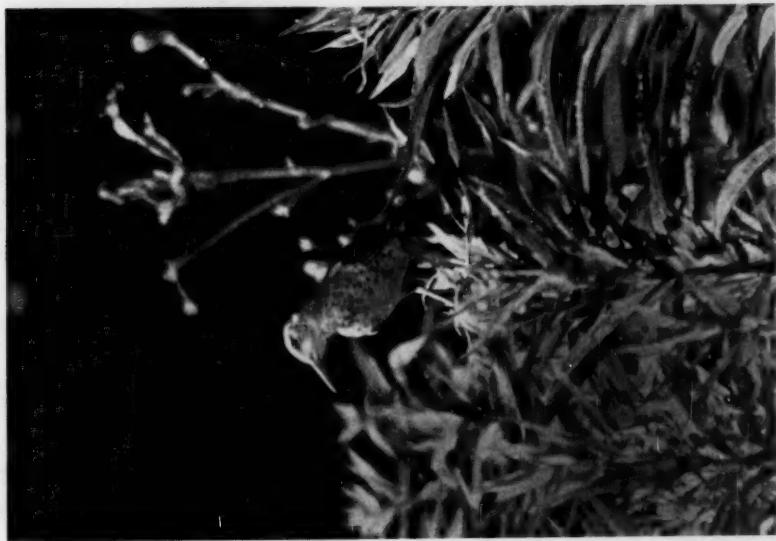
*Plates 27, 28*

It certainly came as a great surprise to find that out of over eighty species of sandpipers and plovers treated by Bent in his 'Life Histories of North American Shore Birds, Order Limicolae' (Bull. U. S. Nat. Mus., no. 146, pt. 2, pp. 78-97, 1929), the Spotted Sandpiper (*Actitis macularia*) held the lowest incubation period, namely fifteen days, no other species having less than seventeen days, and only two I think at that, all the others ranging from twenty-one to twenty-eight days. In a paper on the 'Diving Habit and Community Spirit' of this sandpiper published in 1920 (Canadian Field-Naturalist, vol. 34, pp. 96-97, 1920), I drew attention to the little we really know of the very intimate home life and traits of even the commonest birds, as only just lately had the incubation period of the Common Sandpiper (*Tringa hypoleucos*) of Europe (a first cousin to our Spotted) been ascertained to be twenty-one days. It was only in 1935, that the opportunity came to me of going into this matter with regard to our Spotted Sandpiper, for in that year I was fortunate enough to find two nests in the making, and to note the date of the first egg laid in each case, besides obtaining pictures of the hatching of the chicks, their hiding, and the parent brooding them. Both these nests were very carefully watched, and in each case the young hatched out on the twenty-first day from the laying of the last egg. This past year (1936), I had hoped to find these birds back on their old ground and to corroborate my records still further. Only one nest, however, was located on June 14 (twelve feet from the site of last-year's nest), but unfortunately it contained four eggs. From the actions of the parent as it flushed from the eggs (I shall refer to this later), I think it had been incubating a few days. These eggs hatched out on June 30, so even in this case I had watched the incubating bird for sixteen days, and feel sure I could safely add another four or five days, as the parent when flushing resorted to the so-called 'injury-feigning' trick, as seldom done unless incubation has been in progress a few days; as a rule the bird merely contents itself with quickly running off the nest, without any demonstration, if the set of eggs is incomplete, or quite fresh. When flushing, not only the smallness of the parent, but its behavior, put into my mind two thoughts: (1) Was it the male that was incubating? and (2) Why not pay especial attention to Dr. Friedmann's theory regarding this so-called 'injury-feigning' trick? With these two thoughts in mind, I paid frequent visits to the nest, in all about a dozen on different days before the hatching of the eggs. The nest

<sup>1</sup> Read before the American Ornithologists' Union, Pittsburgh, Pa., October 22, 1936.

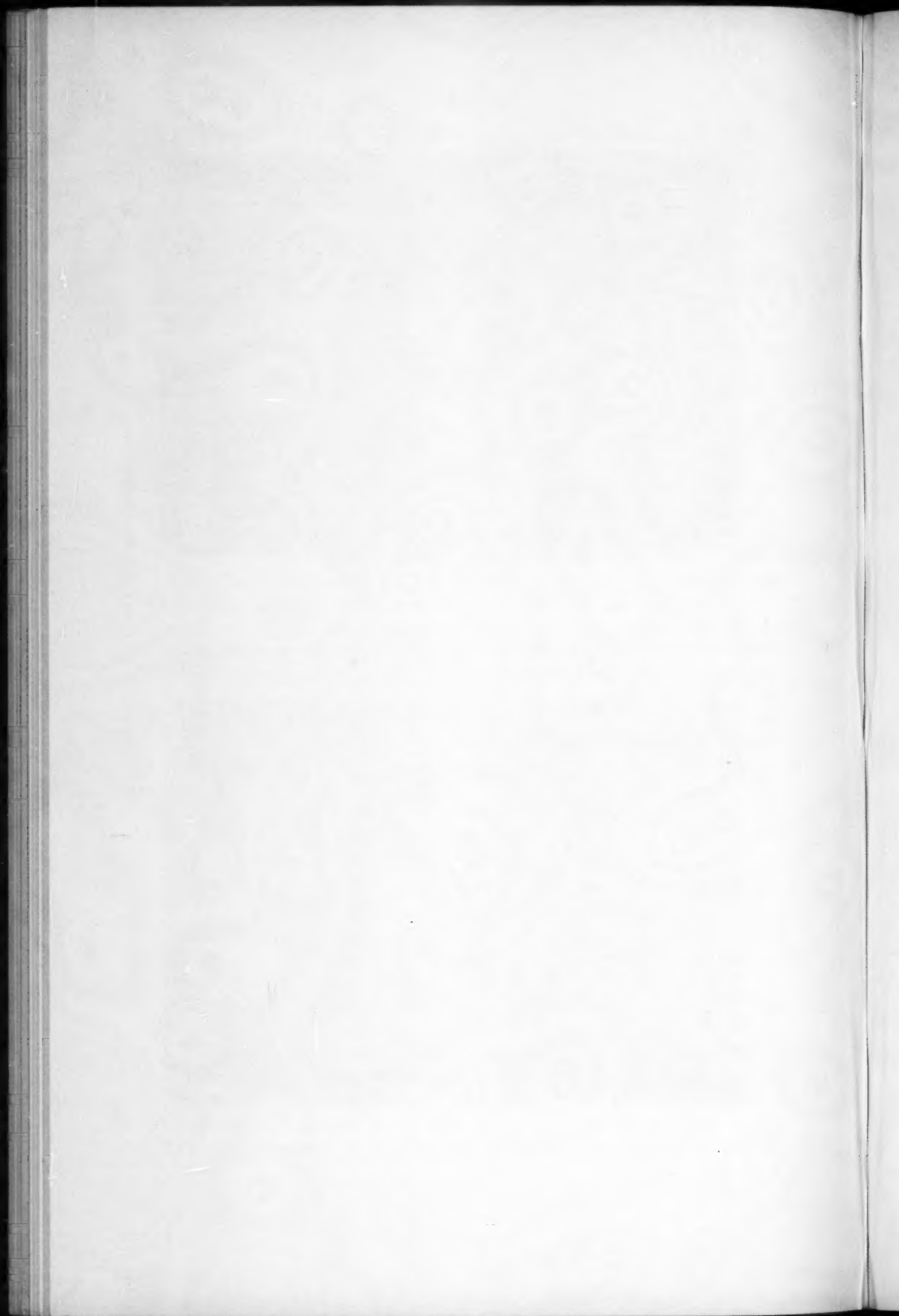
was nearly at the top of a little embankment alongside a railway track, and it was the invariable custom of the incubating bird whenever I appeared above the nest, to run down the bank and along a dry ditch at its foot, sometimes displaying and squealing (if I attempted to follow); at others, merely contenting itself with running along for some little distance, or even at times standing still, before taking flight. On every occasion it was the same small bird with lightly spotted breast, and at the time I made up my mind to collect it at the end of the study and prove its sex. Fortunately, this was not necessary as will be seen later. I never once saw a second bird at the nest, but on one occasion a larger and more heavily spotted one was noted some hundred yards or so away. On the day of the hatching, however, both birds came to meet me as I approached the nest. I could see at a glance the appreciable difference in size and heavier markings on the breast of the female compared to the male, the smaller and lighter-marked bird I had been watching, and the one that now made all the fuss of wing demonstration, sometimes curling itself, as it were, into a little ball as it ran along, reminding me very much of a little hedgehog, whilst the female merely ran rapidly about in all directions. There were no misgivings on my part that the male had done most, if not all of the incubating, as has been proved by Miss Theodora Nelson (*Bird-banding*, vol. 1, pp. 1-13, pls. 1-6, 1930), and by others again in the case of the male Least Sandpiper (*Pisobia minutilla*).

The young had left the nest and were in hiding not far off, but I failed to find them, so decided to give up the search for the present and return again later, in the hope that by then the parents would eventually have led them to more open ground across the railway tracks (as was the case the previous year), where some timber screens used in the winter to prevent snowdrifts on the railway are stacked up at intervals, thus forming excellent vantage points for the parents to watch the young and give warning whenever danger threatened. I did not return for some hours, but when I did, sure enough, the young had been enticed away from the nest to the old feeding ground of last year, with a parent keeping guard perched on one of the stacks. As I drew nearer, I could see that this bird was the male, who was soon joined by his partner when he alighted on the ground and ran to meet me. The young were not visible, and so long as I remained stationary, the parents did not display any great emotion, but immediately I began to move about they became very excited, especially the male, running all around and about me in every direction, thus giving me another excellent opportunity of comparing their size and markings at close quarters and on open ground, and eliminating the necessity of collecting them. The broken-wing trick was not resorted to by either bird, except by the male (slightly) on one or two occasions, when I made as if to follow it; but both birds merely contented themselves by running about very excitedly in all directions, the



MALE SPOTTED SANDPIPER PERCHED ON GOLDENRODS





male always in the forefront quite close, the female behind him and well away from me. I managed to take a few snapshots of them, a somewhat difficult and unsatisfactory business with a plate camera. After a time, and failing to find the young, I sat down, when the male returned to his lookout on one of the stacks, and the female must have quietly taken herself off, as I never saw her again. Resuming my search after a time for the young, I must have come very near their hiding place in a large bed of tall goldenrods, which I had not thought of looking in before for, without any warning, the male suddenly became very excited, flying all around me and trying to perch on every obstacle that came in its way. This reminded me vividly of my experience at Hatley, on July 19, 1915, with an excited parent with young under similar conditions, which finally ended up by perching on a cat-tail head (*Auk*, vol. 33, p. 66, 1916). When I resumed my search near the goldenrods, the male became more and more excited, in fact, demented is the only word for it, flying not only around and about me, but all over the area in wide circles, eventually landing on the top of a goldenrod plant where it became normal again, remaining long enough for me to take two snapshots of it in that position. This exhibition was so novel and exciting that I decided to see if it would be repeated on a subsequent visit. So a few days later I again visited the spot, when the young would have grown somewhat, and be easier no doubt to find. On arrival, the male was again on his vantage ground, the stack of screens, and by hiding, I at last saw one young come out into the open (away, however, from the goldenrods); but before I could reach it the parent had given the warning note and it had vanished, never to be seen again. It was evident that the young were scattered about, as on again approaching the belt of goldenrods the male became even more demented than on my previous visit, flying excitedly about in all directions as if not knowing what to do, sometimes trying to perch in trees, at others on goldenrods, and yet again running rapidly over the ground in all directions, without displaying. This latter phase, i. e., not displaying, gave me the idea of seeing what it would do if I followed its movements slowly. So long as I did so, it merely kept running in front of me, but immediately I doubled my pace, in fact ran, thus gaining on it rapidly, it resorted to the so-called 'injury-feigning' trick, ruffling up its feathers until it looked like a little ball rolling along, as already described, and sometimes squealing loudly. After these displays had lasted a few moments, the bird became normal again, running along the ground for a short distance before rising and flying back to its lookout post on the stacks. As already mentioned, it is not easy to obtain snapshots in focus with a plate camera, irrespective of being on the spot at the right moment, but I was certainly fortunate in obtaining about half a dozen somewhat unique pictures of this sandpiper perched in trees and on goldenrod plants, more especially the latter. Altogether,

during the three hours of this and my previous visit, I must have seen this bird perched in these un-sandpiper-like positions at least two dozen times. The female never put in an appearance, and this was the case in the previous year; only one parent was present, and I feel sure it was the male from this year's experience. The male when perched on the stacks gave vent to the sharp alarm notes *weet, weet*, almost continuously, interspersed very occasionally with *pip, pip, pip*, notes which I cannot remember having heard at any other time.

Before summing up, let us for a moment consider the literature on this so-called 'injury-feigning' subject. First of all, there is Dr. Friedmann's notable work, 'The Instinctive Emotional Life of Birds' (Psychoanalytic Review, vol. 21, 1934) reviewed in the January issue of 'The Auk' for 1935, in which the author considers the so-called 'broken-wing ruse' of many birds to draw an intruder away from the nest or young, as rather the result of conflict between the emotion of fear, occasioned by the approach of an apparent enemy, and the reproductive emotion, which makes the bird loath to leave the nest. The conflict of emotions produces muscular inhibition or inability to fly, until the fear emotion gains control, as the bird gets farther and farther from the nest. This opinion I find has already been held by Dr. Douglas Dewar who, in his 'Birds at the Nest' (London, 271 pp., 1928) devotes a whole chapter (pp. 167-194) to the 'broken-wing trick.' On page 168 he says: "For years have I urged that it is a mistake to say that the parent bird pretends to be wounded. The movements in question are the result of mental disturbance, caused by the clash of conflicting instincts—the parental instinct opposing itself to the instinct of self-preservation. The result of this clash of instincts is that the bird loses temporarily its mental balance and is unable properly to control its movements." As long ago as 1847, Dewar goes on to say, Jonathan Couch wrote ('Illustrations of Instinct,' p. 243): "It may be questioned, whether the lameness and fluttering are not so much the paralysing affections of fear as of cunning," and more recently Eliot Howard as the result of prolonged study of the habits of British warblers has asserted that birds do not deliberately feign injury. Of course there are others who hold this 'broken-wing trick' as instinctive, of which Dewar mentions several whilst giving their reasons supporting their contentions. More recently in this category, I might mention the name of the late Harry S. Swarth and others, who have expressed their views in letters to the Editor in recent numbers of 'The Auk.' After giving the names of those who do not apparently support his views, Dewar goes on to deal with the views and experiences of those who do so, under the following eight very pertinent headings, which I take the liberty of enumerating:

- (1) Birds have neither the requisite knowledge nor the intelligence to

enable them to practise such a ruse. The performers, in order consciously to deceive, must know how a bird having a wounded wing behaves. It has no means of acquiring this knowledge.

(2) If birds when performing these antics are deliberately feigning injury in order to entice intruders from their young, it is most surprising that so many species have hit upon this ingenious device, birds belonging to very varied families and living in all parts of the world.

(3) Birds often flutter about, as though injured, in circumstances in which such behavior cannot assist the young in any way, indeed occasionally, when it betrays their presence.

(4) If a bird knowingly simulated injury in order to draw an observer from its young or eggs, we should expect it to be careful to keep in view of the intruder while so performing, but this does not always happen.

(5) If birds feign injury in order to entice an intruder from their young, or if the behavior be instinctive, we should expect the same parent to perform the trick with the same vehemence at all times when the young are unable to move as quickly as the parent. This does not appear to be the case; at all events, the behavior is not always equally vehement in any given species.

(6) If birds feign injury to entice an intruder from their nest, we should expect both parents to take part in the game, but this does not always happen. Sometimes the female will perform these antics while the male shows fight; at others the male appears to be surprised at the behavior of its mate.

(7) Eliot Howard records ('British Warblers') that warblers sometimes, under the influence of sexual excitement, behave as though they were injured.

(8) Many birds, when their young are threatened, perform antics which do not make the bird appear to be feigning injury.

Let us now consider the points raised in the present paper, as follows: (1) that with more intensive study on the part of other ornithologists, I feel sure that the incubation period of the Spotted Sandpiper will be found to be nearer twenty or twenty-one days rather than fifteen; (2) also, that with more intensive study it will be found that the male more often than is generally supposed, takes entire charge of the incubation of the eggs; (3) that the evidence produced with regard to the so-called injury-feigning trick seems more in favor of its being considered the result of the clash of conflicting emotions rather than the result of instinct or intelligence. In support of the former, what better evidence could be found than the behavior of the bird on July 6, the day on which I spent three hours watching it? As already stated, the conflicting emotion of fear at my presence coupled with the emotion of parental anxiety for the safety of the young literally

drove the bird crazy, in fact, demented; and its normal equilibrium was only restored upon its coming to rest either in the trees or on the goldenrod plants. This behavior seems to fit in beautifully with what Dewar says: "The result of this clash of instincts is that the bird loses temporarily its mental balance and is unable properly to control its movements." Reverting to its behavior at the nest, this always seemed of a very stereotyped order, for directly I appeared above the nest it would always run down the slope into the drain at its foot, run along this, sometimes displaying, at others merely running for a short distance, and then taking wing. The broken-wing trick was only resorted to if I attempted to follow rapidly (to try and get a snapshot) as was the case on July 6, as already described. May we not attribute this behavior on both occasions to the emotion of self-preservation at my very near approach asserting itself as strongly as the parental emotion, causing for the moment that muscular inhibition described by Dr. Friedmann, which prevents the bird from rising and flying? Certainly, the flight never took place until the bird had come out of its contortions, and had run along a little, and so regained its normal equilibrium.

In conclusion, may not many of the varied antics displayed by birds at courtship and other times, be the result rather of involuntary movements caused by great excitement at a time when they are in a very nervous state, rather than the result of instinct or intelligence?

Since this paper was written, my attention has been drawn to an article 'Injury-feigning in Birds' by the Rev. F. C. R. Jourdain, published in 'The Oologists' Record' for June, 1936, pp. 25-37, in which the author states that the main object of his paper is to show how far this habit is prevalent among Palaearctic birds, rather than to discuss the meaning and origin of actions in beings whose mentality is utterly different from our own. However, while Jourdain admits that the theory that the bird is the victim of contrary emotions explains most cases, he thinks that it does not account for all; yet he states that the action "is not the result of a thought out plan to make the looker-on believe that the bird has been injured."

POSTSCRIPT.—Following the above account I have had the good fortune this summer (1937) of verifying my suppositions of last year. The birds came back and nested again in the very identical spot in the ground as last year; the first egg was deposited on May 25, the last on May 28. After the laying of the eggs, the female was never seen again at the nest, not even at the hatching of the young (as was the case last year), at which I was fortunate enough to be present on June 17. The incubation period was thus twenty days as against twenty-one of last year. The incubating bird behaved exactly as last year, and again I felt sure it was the male. Arriving at the nest early on the morning of June 17, I found two of the young dried



SPOTTED SANDPIPER BROODING



NEWLY HATCHED SPOTTED SANDPIPER HIDING



out, the remaining two in the wet stage only partially dried out. On my return some two hours later, one young only remained in the nest.

Two days later, from the actions of the parent, all four were discovered with some difficulty sixty yards from the nest. The parent had led them across one track of rails but not to the same ground as last year. At a later visit the same day, the parent had led them still farther away, until they were now 190 yards from the nest, and it looked as if further delay might lose me the opportunity of this time verifying the sex of the parent. Much as I hated it, I steeled my heart and collected the bird from the top of a box freight-car, its lookout post on this occasion, for there were no stacks of timber on this side of the tracks as there were last year. As I had surmised both last, and again this year, the incubating parent turned out to be the male.

It should now prove interesting as well as desirable, to get at the respective rôles played by the sexes in the home life of this species. Do the females, as in the case of the phalaropes, press their suits on the males at courtship times, or otherwise? Unfortunately, sight identifications in this matter have so far proved entirely fallacious, and much as we may dislike it, the matter can only be definitely settled by the judicious collecting of a number of the displaying or aggressive birds at courtship times.

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## BIRD LIFE ON THE NORTH CAROLINA COAST

BY THOMAS D. BURLEIGH

IN THE course of field work carried on by the writer in North Carolina, advantage was taken of occasional infrequent trips to the coast to study the bird life there, and the following notes include those species considered of sufficient interest to comment upon at this time.

Altogether opportunity was afforded to visit this eastern edge of the State four times. In 1931, January 16 to 21, inclusive, was spent at such widely separated spots between Elizabeth City and Wilmington as Oregon Inlet, Fort Macon, and Fort Fisher. In 1932, the writer, in company with Arthur H. Howell, devoted fifteen days, May 20 to June 4, to a study of the breeding birds in the entire stretch of coast between Back Bay, Virginia, and Murrell's Inlet, South Carolina. In 1934, two days, July 19 and 20, were spent at Stumpy Point, on Pamlico Sound, and August 13 to 25, inclusive, at Kitty Hawk, on Albemarle Sound. The list that follows is admittedly incomplete and concerns largely species of uncertain status or of infrequent occurrence in this region. In a few instances certain races are here recorded for the first time as breeding in the State.

COMMON LOON, *Gavia immer immer*.—An unusually late record is that of a bird seen in an open channel in the salt marsh at Seaside, June 3, 1932.

SOOTY SHEARWATER, *Puffinus griseus*.—An injured bird, unable to fly but still alive, was picked up on the ocean beach near Fort Macon, May 28, 1932. There are apparently very few records for this species for the State, and none in recent years.

FLORIDA CORMORANT, *Phalacrocorax auritus floridanus*.—Noted in small numbers on Albemarle Sound in 1934, a single bird being seen August 19 near Kitty Hawk, and two August 23 at Powder Ridge.

LOUISIANA HERON, *Hydranassa tricolor ruficollis*.—An occasional bird was seen at Beaufort, May 29, 1932, feeding at the edge of the salt marsh.

LITTLE BLUE HERON, *Florida caerulea caerulea*.—This species was found to be fairly plentiful at Beaufort, and frequently was seen feeding in the open salt marsh on May 29, 1932.

CANADA GOOSE, *Branta canadensis canadensis*.—It was of decided interest to note the late date at which this species could be found as far south as this. One would expect these birds to be gone by the latter part of April, yet in 1932, a flock of ten was seen on May 20 near Currituck Light, flying over the Sound, and another flock of eight at Powder Ridge on May 23, resting at the edge of the water.

BLUE GOOSE, *Chen caerulescens*.—As there was but one record for the occurrence of this species in the State, it was of interest to find a crippled bird confined in a pen at Salvo, a small fishing hamlet on Pamlico Sound, on January 17, 1931. The owner, who had shot the bird during the past fall, had never seen the species before and regarded it a curiosity.

COMMON MALLARD, *Anas platyrhynchos platyrhynchos*.—On May 22, 1932, at Pine Island, a female Mallard was found at the edge of a pond in the open salt

marsh with four newly hatched young that had apparently just left the nest. This is possibly the first definite breeding record of this species for the State.

**SOUTHERN BALD EAGLE**, *Haliaeetus leucocephalus leucocephalus*.—This species proved to be fairly plentiful at Oregon Inlet in January 1931. On January 18, twelve birds were seen, each perched on the top of a telephone pole where it permitted a fairly close approach before flying.

**NORTHERN CLAPPER RAIL**, *Rallus longirostris crepitans*.—Clapper Rails were plentiful in the wide stretches of open salt-marsh at Beaufort in 1932, and as there was some question as to their subspecific identification, two were collected on May 30. These proved referable to *Rallus l. crepitans*, and it is possible that this marks the northern limit of the range of this race on the Atlantic coast. Two nests were found that day, one with eight eggs that were just hatching and the other with nine well-incubated eggs. Both nests were substantially built of reeds and marsh grass and were rather poorly concealed.

**AMERICAN OYSTER-CATCHER**, *Haematopus palliatus palliatus*.—Fairly plentiful on the ocean beach at Seaside, where on June 3, 1932, six pairs were seen.

**PIPING PLOVER**, *Charadrius melodus*.—At Kitty Hawk, Piping Plovers were fairly plentiful, August 14 to 26, 1934, feeding alone or in small flocks on the mud flats at the edge of Albemarle Sound. None was seen on the ocean beach.

**SEMIPALMATED PLOVER**, *Charadrius semipalmatus*.—At Beaufort, on May 30, 1932, small flocks of these birds were seen at intervals, feeding at the edge of the salt marsh. At Kitty Hawk they were plentiful, August 14 to 26, 1934; small flocks were frequently seen each day.

**WILSON'S PLOVER**, *Pagolla wilsonia wilsonia*.—Fairly plentiful at Seaside, June 3, 1932, where a nest was found that held three slightly incubated eggs.

**KILLDEER**, *Oxyechus vociferus vociferus*.—Killdeer were apparently somewhat scarce on the coast for relatively few were seen. At Kitty Hawk, several birds were noted on August 18, 1934, and only at infrequent intervals thereafter.

**BLACK-BELLIED PLOVER**, *Squatarola squatarola*.—In 1932, scattered small flocks were seen feeding on the ocean beach at Currituck Light on May 20, and a single bird was noted at Seaside, June 3. At Kitty Hawk, in 1934, these birds were rather scarce and noted only at infrequent intervals. A single bird was seen August 14, two August 18, and a flock of four August 21.

**RUDDY TURNSTONE**, *Arenaria interpres morinella*.—This species proved to be a plentiful spring migrant in 1932; numerous small flocks were seen at Currituck Light, May 20, and at Beaufort, May 28. In the fall it apparently is not present in any numbers until September, for at Kitty Hawk in 1934, it was somewhat scarce. A flock of four birds was seen August 14, and other small flocks were noted at infrequent intervals during the remainder of my stay there.

**HUDSONIAN CURLEW**, *Phaeopus hudsonicus*.—I noted the Hudsonian Curlew in 1934 only, two birds were seen on August 20 and a single bird on August 23, feeding near Powder Ridge on the mud flats exposed by the low tide.

**UPLAND PLOVER**, *Bartramia longicauda*.—This species has apparently not been recorded previously from the coast, but judging from my rather limited experience it is not uncommon there, at least in the autumn. At Kitty Hawk in 1934 one bird was seen August 16, another August 18, and three August 24, feeding each time in the short dune grass well up from the water's edge of Albemarle Sound.

**SPOTTED SANDPIPER**, *Actitis macularia*.—Spotted Sandpipers were fairly plentiful at Kitty Hawk in August 1934, and were observed daily feeding with other shore-birds.

**EASTERN WILLET**, *Catoptrophorus semipalmatus semipalmatus*.—A plentiful breeding bird in 1932 wherever conditions were suitable, it was especially numerous at Snead's Ferry, at the mouth of New River, May 31; at Fort Fisher, near Wilmington, June 2; and at Seaside, June 3. Possibly a dozen pairs were nesting in the dry marsh at Fort Fisher, and here three nests were found, two with four eggs each and one with three. The nests were slight hollows in the ground, lined with fragments of marsh grass.

**WESTERN WILLET**, *Catoptrophorus semipalmatus inornatus*.—Willetts were unexpectedly scarce at Kitty Hawk in 1934, single birds being seen at rather infrequent intervals. One taken on August 20, on Albemarle Sound, proved to be referable to this western race.

**GREATER YELLOW-LEGS**, *Totanus melanoleucus*.—Only at Kitty Hawk, August 14 to 26, 1934, did I see this species, and it was somewhat scarce then. Single birds were observed feeding with other shorebirds.

**LESSER YELLOW-LEGS**, *Totanus flavipes*.—Unlike the preceding form, Lesser Yellow-legs were plentiful throughout the entire time I was at Kitty Hawk in 1934. Flocks of from six to ten birds were seen daily in August at various spots along Albemarle Sound, feeding with other shorebirds.

**AMERICAN KNOT**, *Calidris canutus rufus*.—In 1932, the American Knot was found to be a plentiful spring migrant on the ocean beaches; small flocks of from ten to fifteen birds were seen near Currituck Light, May 20; at Beaufort, May 28; and at Fort Fisher, June 2. It is probable that in the fall migration these birds are not present in any numbers before September, for at Kitty Hawk they were very scarce. Two were seen on August 17 and two on August 23, 1934.

**PECTORAL SANDPIPER**, *Pisobia melanotos*.—In 1934, at Kitty Hawk, the Pectoral Sandpiper was one of the most plentiful of the shorebirds found there during the latter part of August. Numerous small flocks were seen daily feeding in the short dune grass well up from the water's edge and rarely associated with other species.

**WHITE-RUMPED SANDPIPER**, *Pisobia fuscicollis*.—Judging from my rather limited experience, the White-rumped Sandpiper is far less plentiful on this coast than is generally supposed. At Kitty Hawk, in 1934, it was looked for without success until the day of my departure, when it was finally found with other shorebirds on the mud flats at Powder Ridge. That day, August 25, four were seen, single birds twice, and toward the end of the morning two, feeding with flocks of Least Sandpipers.

**LEAST SANDPIPER**, *Pisobia minutilla*.—The Least Sandpiper was possibly the most plentiful of the shorebirds seen at Kitty Hawk in August, 1934. Numerous small flocks were seen daily feeding both on the mud flats on Albemarle Sound and in the short dune grass well up from the water's edge.

**RED-BACKED SANDPIPER**, *Pelidna alpina sakhalina*.—Near Rodanthe, on Pamlico Sound, scattered small flocks of these birds were seen on January 17, 1931, so they apparently winter regularly on this part of the coast. Their arrival in the fall is much later than that of the other shorebirds, for at Kitty Hawk, in 1934, but a single bird was seen during my stay there, feeding, August 21, with a flock of Semipalmated Sandpipers on a mud flat exposed by the low tide.

**INLAND DOWITCHER**, *Limnodromus griseus hendersoni*.—Dowitchers were fairly plentiful at Kitty Hawk during the latter part of August, 1934. Small flocks of from four to twelve birds were seen daily feeding with other shorebirds at suitable spots on Albemarle Sound. One bird taken August 14, 1934, is clearly referable to this recently described race from the interior of Canada.

**STILT SANDPIPER**, *Micropalama himantopus*.—My one record for the occurrence of

this species on the coast is that of three birds seen near Powder Ridge, August 25, 1934, feeding with other shorebirds on the Albemarle Sound mud flats exposed by the low tide.

**SEMI-PALMATED SANDPIPER, *Ereunetes pusillus*.**—The Semipalmated Sandpiper was found to be a plentiful migrant both late in May and in August. In 1932, numerous small flocks were seen near Currituck Light, May 20, and at Beaufort, May 28; while in 1934, small flocks were seen daily at Kitty Hawk, August 14 to 26, feeding on the mud flats on the shore of Albemarle Sound. As with the other shorebirds, few were seen on the ocean beach.

**WESTERN SANDPIPER, *Ereunetes maurii*.**—At Rodanthe a flock of six birds was seen, January 17, 1931, and a male collected. The species proved to be plentiful in migration in August, for at Kitty Hawk, in 1934, small flocks were seen daily feeding with the other shorebirds. One bird, a female, was taken August 21.

**MARbled GODWIT, *Limosa fedoa*.**—My one record for the occurrence of this species on this stretch of coast is that of a single bird taken at Kitty Hawk, August 18, 1934, as it fed alone on a mud flat exposed by the low tide.

**SANDERLING, *Crocethia alba*.**—Sanderlings were seen on each trip to the coast, and seemingly are plentiful there throughout most of the year. In 1931, scattered flocks were seen at Oregon Inlet, January 16, 17, and 18; in 1932, small flocks were noted at Pine Island on Currituck Sound, May 22, and at Fort Fisher, near Wilmington, June 2; and in 1934, single birds or small flocks were observed daily, August 14 to 26, both on Albemarle Sound and on the ocean beach.

**GREAT BLACK-BACKED GULL, *Larus marinus*.**—This stretch of coast is near the southern limit of the winter range of the Great Black-backed Gull, and the species was found to be rather scarce. Four birds were seen on January 17, 1931, at Oregon Inlet, three at one spot and one at another, feeding on the ocean beach with Herring Gulls.

**HERRING GULL, *Larus argentatus smithsonianus*.**—The Herring Gull winters abundantly on the coast. Numerous flocks were seen at Oregon Inlet, January 18, and at Fort Macon, January 20, 1931. It is apparently late in May before all the birds have departed for the north, for near Currituck Light, on May 20, 1932, fully a hundred were noted during the morning, feeding on the ocean beach. It is September before many of these birds have returned from their breeding grounds, for at Kitty Hawk, in 1934, two birds were recorded for the first time on August 18, and others at only infrequent intervals thereafter.

**LAUGHING GULL, *Larus atricilla*.**—The Laughing Gull is plentiful on this stretch of coast during the summer months, but apparently does not winter, as no birds were seen in January, 1931. At Beaufort, on May 28, 1932, small flocks were frequently noted; while in 1934, the birds were abundant at Stumpy Point, on Pamlico Sound, July 20, and at Kitty Hawk, both on Albemarle Sound and on the ocean beach, during the latter part of August.

**GULL-BILLED TERN, *Gelochelidon nilotica aranea*.**—At Kitty Hawk, August 16 to 26, 1934, this species was found to be relatively scarce. Single birds were seen at infrequent intervals feeding with the other terns.

**FORSTER'S TERN, *Sterna forsteri*.**—This was the commonest of the terns found on Albemarle Sound at Kitty Hawk. Small flocks were seen daily, August 17 to 26, 1934.

**COMMON TERN, *Sterna hirundo hirundo*.**—Fairly plentiful at Kitty Hawk and noted daily in small numbers feeding alone or with the other terns.

**LEAST TERN, *Sterna antillarum antillarum*.**—This species has increased percepti-

bly in numbers in recent years. Small colonies now breed at suitable spots along the whole of this coast. In 1932, it was plentiful at Beaufort, May 28, and was noted in equal numbers at Snead's Ferry, at the mouth of New River, May 31, and at Seaside, June 3. It was somewhat scarce at Kitty Hawk in the latter part of August, 1934, and was noted at infrequent intervals only.

ROYAL TERN, *Thalasseus maximus maximus*.—Royal Terns were fairly plentiful at Kitty Hawk, August 16 to 26, 1934. Small flocks were seen daily on Albemarle Sound.

CASPIAN TERN, *Hydroprogne caspia imperator*.—My one record of this species on this stretch of coast is that of a single bird seen at Powder Ridge, August 25, 1934, resting alone at the edge of the water on Albemarle Sound.

BLACK TERN, *Chlidonias nigra surinamensis*.—The Black Tern proved to be fairly plentiful at Kitty Hawk in the latter part of August, 1934, and was seen daily both on the ocean beach and on Albemarle Sound, frequently feeding with other terns.

BLACK SKIMMER, *Rynchops nigra nigra*.—At Seaside, on June 3, 1932, a small colony of six pairs of these birds was found nesting on a sand bar at the edge of the salt marsh. The nests on that date were merely slight hollows in the sand. At Kitty Hawk, on August 19, 1934, a flock of possibly twenty birds was seen, practically all of them fully grown young of the year.

EASTERN GROUND DOVE, *Columbigallina passerina passerina*.—Records for this species in the State are relatively few, so it was of interest to find two birds feeding at the edge of a field near Fort Fisher on June 2, 1932.

CHUCK-WILL'S-WIDOW, *Antrostomus carolinensis*.—This species is apparently somewhat scarce on the coast, for only at Swanquarter, at dusk on May 25, 1932, was a single bird heard at the edge of a stretch of open pine woods.

RED-HEADED WOODPECKER, *Melanerpes erythrocephalus*.—The Red-headed Woodpecker was rather scarce, and seen only at infrequent intervals. It was noted near Folkstone, June 1, and at Wilmington, June 2, 1932, in stretches of open pine woods.

RED-CKOKADED WOODPECKER, *Dryobates borealis*.—Four birds, characteristically noisy, were seen in open pine woods near Beaufort, May 28, 1932.

NORTHERN CRESTED FLYCATCHER, *Myiarchus crinitus boreus*.—These birds were plentiful, and frequently seen in the scattered stretches of woods. Specimens taken on May 21, 1932, at Pine Island on Currituck Sound proved referable to this northern race.

NORTHERN HORNED LARK, *Otocoris alpestris alpestris*. PRAIRIE HORNED LARK, *Otocoris alpestris praticola*.—Flocks of Horned Larks, containing from thirty to forty individuals, were seen at infrequent intervals in the sand dunes south of Kitty Hawk in January, 1931. A female taken from a flock near Kitty Hawk, January 16, proved referable to the northern race (*alpestris*), while another female shot from another flock on the following day at Salvo was found to be typical of the more southern breeding bird (*praticola*). Possibly both forms are equally common on the coast during the winter months.

TREE SWALLOW, *Iridoprocne bicolor*.—Five birds, rather belated migrants, were seen on May 22, 1932, feeding over the salt marsh at Pine Island.

BARN SWALLOW, *Hirundo erythrogaster*.—There are very few definite breeding records for this species in the State, so it is of interest to record a colony of twelve pairs of these birds found nesting under a boat landing at Pine Island, May 20, 1932. The nests were on pilings or plastered against the beams of the landing, and were largely inaccessible because of the depth of the water. Of the four that could be

reached, one was fully built but as yet empty, one held four fresh eggs, and the other two, five eggs each, slightly incubated.

**PURPLE MARTIN**, *Progne subis subis*.—At Kitty Hawk, on August 22, 1934, Martins were observed migrating south in large numbers. Flocks of varying size, frequently containing a hundred or more individuals, were seen throughout most of the forenoon. In the dunes, where such flocks were feeding overhead, birds were frequently seen resting on the sand, appearing rather out of place as they dotted the ground in all directions.

**SOUTHERN BLUE JAY**, *Cyanocitta cristata florincola*.—Blue Jays were apparently somewhat scarce on this stretch of coast, for only at infrequent intervals were any seen. A male taken at Folkstone, June 1, 1932, proved referable to this southern race.

**FISH CROW**, *Corvus ossifragus*.—Although a common breeding bird, the Fish Crow winters rather sparingly on this stretch of coast, for I saw few individuals while I was at Oregon Inlet, January 16 to 19, 1931. At Pine Island, a nest was found, May 21, 1932, that held two fresh eggs, and was but eight feet from the ground in the top of a myrtle bush standing at the edge of a stretch of open salt marsh.

**OHIO HOUSE WREN**, *Troglodytes aëdon baldwini*.—House Wrens are rather local in their distribution on the coast during the summer months, for only at a few spots were they found breeding. Possibly the most southern breeding record on the Atlantic coast is that of a pair of birds found nesting in an old slashing near Beaufort, May 28, 1932. At Stumpy Point, on July 20, 1934, these birds were found to be fairly plentiful. Four singing males were seen about the town, and others were noted later that day in the short scattered stretches of pine woods. A male taken at Beaufort and another at Stumpy Point were found to be clearly referable to this newly described race, despite the fact that this should be within the range of the eastern form.

**CAROLINA WREN**, *Thryothorus ludovicianus ludovicianus*.—Two birds were seen near Salvo on January 17, 1931, in the one small stretch of woods that still persists on this part of the coast, and on May 22, 1932, a nest with large noisy young was found in an old shed at the edge of the salt marsh at Pine Island.

**WAYNE'S MARSH WREN**, *Telmatodytes palustris waynei*.—This well-marked race, but recently described, was found in 1932, breeding abundantly in the stretches of salt marsh so characteristic of the northern half of this stretch of coast. It was especially numerous on May 20 at Pine Island, on Currituck Sound, when males could be heard singing on all sides throughout the morning. Nesting was barely under way at that date, for a nest found was but partially built. At Swanquarter, on Pamlico Sound, these birds were fairly plentiful May 25, but perceptibly scarcer than at other points farther north. Farther south none was noted either at Beaufort or Snead's Ferry, so there apparently is a large gap between the breeding range of this form and that of *Telmatodytes palustris griseus* found in northern Florida, Georgia, and South Carolina.

**CATBIRD**, *Dumetella carolinensis*.—Although the Catbird is known to winter regularly on the coast of North Carolina, it was of interest to find two birds in the small isolated stretch of woods near Salvo, January 17, 1931. In 1932, the species was found to be fairly plentiful in the breeding season as far south as Wilmington, where on June 2, it was frequently noted in thickets and underbrush at Fort Fisher.

**SOUTHERN ROBIN**, *Turdus migratorius achrusterus*.—The Robin was found to be scarce on the coast in the breeding season. Two birds seen at Washington, in Beaufort County, on May 26, 1932, possibly mark the southern limit of the species during the summer months in this part of the State.

**LOGGERHEAD SHRIKE**, *Lanius ludovicianus ludovicianus*.—Although somewhat scarce and local in its distribution, this subspecies is apparently resident in this part of the State. A male taken at Tarboro, January 15, 1931, and a female at Hubert, fifty miles south of Beaufort, May 31, 1932, proved referable to the southern race.

**MIGRANT SHRIKE**, *Lanius ludovicianus migrans*.—A male taken at Tarboro, January 15, 1931, was found to be typical of this northern form.

**NORTHERN WHITE-EYED VIREO**, *Vireo griseus noveboracensis*.—White-eyed Vireos were found to be plentiful in 1932 along this entire stretch of coast, and were in evidence daily in the thickets and stretches of underbrush. Males taken at Powder Ridge, May 23, and at Fort Fisher, June 2, proved referable to this northern race.

**PROTHONOTARY WARBLER**, *Protonotaria citrea*.—This species was found to be plentiful in 1932 in stretches of swampy woods where cypress and tupelo gum predominated. It was noted at Columbia, May 24; at Lake Mattamuskeet and Swanquarter, May 25; and at Beaufort, May 28.

**YELLOW WARBLER**, *Dendroica aestiva aestiva*.—Although the Yellow Warbler has never been recorded as breeding on the North Carolina coast, it apparently has merely been overlooked, for in 1932 it was found to be actually plentiful on Currituck Sound. Scattered pairs were seen in the willow thickets bordering the open salt marsh at Pine Island on May 20 and 21. On May 23, several males, singing, were noted at Kitty Hawk, and on May 25 a single male, singing, and unquestionably a breeding bird, was seen in willows bordering Lake Mattamuskeet. This last possibly marks the southern limit of this species during the summer months on the Atlantic coast.

**MYRTLE WARBLER**, *Dendroica coronata coronata*.—The Myrtle Warbler is surprisingly abundant on this stretch of coast during the winter months; flocks of varying size are seen literally everywhere at that season. At Fort Macon, on January 20, 1931, these birds were not only seen in the myrtle thickets, but were feeding as well in the sparse grass in the sand dunes, in the open salt marsh, and even about several unoccupied houses.

**WAYNE'S WARBLER**, *Dendroica virens waynei*.—Present knowledge of the distribution of this recently described race on the Atlantic coast is rather meager, so in 1932, it was looked for wherever there was any possibility of finding it. It was first noted near Columbia on May 24, when four males, all singing, were seen that morning in a stretch of swampy and rather open woods. They invariably kept in the tops of the tallest trees where it was exceedingly difficult to see them, and but for their persistent singing, they would doubtless have been overlooked. The following day, May 25, one male was seen in cypress woods bordering Lake Mattamuskeet. It sang at frequent intervals while watched, and unquestionably was breeding there.

**YELLOW-THROATED WARBLER**, *Dendroica dominica dominica*.—This species was fairly plentiful on this stretch of coast, and frequently noted in 1932 in pine woods. It was especially numerous at Columbia, May 24; at Swanquarter, May 25; and at Snead's Ferry, June 1.

**NORTHERN PRAIRIE WARBLER**, *Dendroica discolor discolor*.—This was one of the most abundant and widely distributed of the warblers of this part of the State. In 1932, it was seen daily, and was found practically everywhere where thickets or stretches of underbrush occurred. It was especially abundant at Kilkenny on May 24, in the wide stretches of desolate cut-over pine woods found there, although almost equally numerous in the stretches of open pine woods at Swanquarter on May 25, and about the thickets of myrtle and live oak on the islands near Beaufort on May 28.

ATHENS YELLOW-THROAT, *Geothlypis trichas typhicola*.—Yellowthroats were plentiful, and seen daily in 1932, about thickets and stretches of underbrush in the open pine woods, at the edges of the salt marsh, and on all the islands. Males taken at Pine Island, May 21; at Columbia, May 24; at Swanquarter, May 25; at Fort Macon, May 28; at Snead's Ferry, May 31; and at Fort Fisher, June 1, were all referable to this newly described race.

YELLOW-BREASTED CHAT, *Icteria virens virens*.—Although there are apparently no previous records for the occurrence of this species on the coast during the summer months, it undoubtedly breeds sparingly in this part of the State. A male was seen at Beaufort, May 28, in a live-oak thicket in open woods.

SOUTHERN MEADOWLARK, *Sturnella magna argutula*.—A male taken near Currituck Light, May 20, 1932, is referable to this southern race.

BOAT-TAILED GRACKLE, *Cassidix mexicanus major*.—Although this species is a common breeding bird on this stretch of coast, it apparently does not winter in any numbers, for at Oregon Inlet on January 18, 1931, but a few small scattered flocks were seen. Fully grown young out of the nest for some time were seen at Beaufort, May 28, 1932.

FLORIDA GRACKLE, *Quiscalus quiscula aglaeus*.—Despite the fact that the northern range of this southern race is supposedly limited to South Carolina, it was found to breed as far north as Albemarle Sound, and was well distributed on this stretch of coast. Two specimens taken in 1932, a male at Kitty Hawk, May 23, and a female at Lake Mattamuskeet, May 25, were clearly referable to this form.

EASTERN COWBIRD, *Molothrus ater ater*.—A flock of twenty birds, largely adults, seen at Kitty Hawk, August 20, 1934, suggested the possibility that this species may breed here on the coast.

PAINTED BUNTING, *Passerina ciris*.—The Painted Bunting was not noted in 1932 north of Beaufort, but there it was found, on May 28, to be almost plentiful, although largely limited in its distribution to the myrtle and live-oak thickets on the coastal islands.

ALABAMA TOWHEE, *Pipilo erythrophthalmus canaster*.—This well-marked subspecies was found to be plentiful throughout the year on this entire stretch of coast, and its presence, determined by specimens taken, definitely eliminated suppositions advanced in past years that both *Pipilo erythrophthalmus erythrophthalmus* and *P. e. alleni* were found during the summer months in the eastern part of the State. At Fort Macon, on January 19 and 20, 1931, Alabama Towhees were found in all the scattered myrtle and live-oak thickets, and were actually plentiful there. Specimens taken then, both males and females, were clearly referable to this race. In 1932, towhees were found to be equally plentiful in the breeding season here on the coast, and males taken at Kilkenny, May 24; Swanquarter, May 26; Beaufort, May 27; and Fort Fisher, June 1, all proved typical of *canaster*.

IPSWICH SPARROW, *Passerculus princeps*.—The Ipswich Sparrow was found in 1931, to be fairly plentiful during the winter months on this stretch of coast; single birds, rarely two or three together, were seen at Oregon Inlet, January 16, 17, and 18, feeding here and there in the sparse beach grass. At Fort Macon, on January 20, a single bird was seen feeding with Savannah Sparrows on the side of a sand dune.

EASTERN SAVANNAH SPARROW, *Passerculus sandwichensis savanna*.—This species proved to be rather plentiful at Oregon Inlet, January 16, 17, and 18, 1932. Scattered flocks were frequently seen each day feeding in the sparse beach grass. It unquestionably winters abundantly here on the coast.

EASTERN HENSLOW'S SPARROW, *Passerherbulus henslowi susurrans*.—While I was

at Stumpy Point on July 20, 1934, a Henslow's Sparrow was heard singing from the edge of a wide stretch of open and slightly marshy meadow. Lack of time prevented a search for a nest or young, but there is little question that at least one pair of these birds nested there. Although recorded as breeding in 1932, near Chapel Hill, this extends materially the breeding range of this species on the Atlantic coast, since there have been no records heretofore south of southern Virginia.

NELSON'S SPARROW, *Ammospiza caudacuta nelsoni*.—A late migrant, a female, was taken in the open salt marsh at Beaufort, May 27, 1932.

MACGILLIVRAY'S SEASIDE SPARROW, *Ammospiza maritima macgillivrayi*.—A detailed study, in 1932, of the distribution of this Seaside Sparrow on this stretch of coast showed it to be confined largely to North Carolina, with the center of abundance between Swanquarter and Snead's Ferry. At Pine Island, where it was first noted May 21, it was somewhat scarce, despite an almost unlimited area of salt marsh. Here it was found at but two widely separated spots, five or six pairs nesting together where the marsh grass was relatively high and thick. At Swanquarter, on May 25, at Beaufort, May 28, and at Snead's Ferry, May 31, it was plentiful, while at Fort Fisher, June 2, it was again scarce and noted in small numbers only. A nest found at Snead's Ferry, near the mouth of the New River, containing four well-incubated eggs, was well concealed in a thick clump of marsh grass. Specimens taken at the localities here mentioned were all clearly referable to this race.

EASTERN CHIPPING SPARROW, *Spizella passerina passerina*.—This species was fairly plentiful at Beaufort in 1932, where, on May 28, fully grown young were seen. An occasional male, singing, was noted at Snead's Ferry on June 1.

ATLANTIC SONG SPARROW, *Melospiza melodia atlantica*.—Song Sparrows were found to be fairly plentiful at Pine Island in 1932. Scattered breeding pairs were seen about myrtle thickets and in the willows bordering Currituck Sound. Specimens taken there May 21 and 22, are clearly referable to this maritime race.

*U. S. Bureau of Biological Survey*  
*New Orleans, Louisiana*

## BIRDS OBSERVED ON THE COAST OF VIRGINIA AND NORTH CAROLINA

BY ALLEN J. DUVALL

A BRIEF trip to the coast of southeastern Virginia and northeastern North Carolina, from May 30 to June 2, 1936, afforded an opportunity to determine certain details of bird distribution in that ornithologically little-known region. The party, consisting of A. H. Howell, W. B. Tyrrell, and the writer, camped one night on the ocean beach, about eight miles east of Pungo, Virginia, then drove down the beach to Oregon Inlet, North Carolina, and on the return trip visited Knott's Island, at the head of Currituck Sound. One object of the trip was to learn whether or not the Short-billed Marsh Wren (*Cistothorus stellaris*) was breeding in the marshes back of the ocean beach east of Pungo, where, on May 19, 1932, we had found a number of birds singing and apparently paired, as reported by Howell and Burleigh (Auk, vol. 51, p. 250, 1934). On the second trip, however, not a single bird of this species could be found. The southernmost record in the breeding season is that of Dr. Alexander Wetmore, who found a nest at Cornfield Harbor, Maryland (Auk, vol. 52, p. 455, 1935). We were interested, also, in learning whether or not the Sharp-tailed Sparrow (*Ammospiza caudacuta diversa*) described by Bishop (Auk, vol. 18, p. 269, 1901) was breeding in North Carolina near its type locality. Our search revealed only a colony of Seaside Sparrows (*Ammospiza maritima macgillivrayi*) in a marsh at Oregon Inlet. It seems probable, therefore, that the Southern Sharp-tailed Sparrow does not breed south of Virginia.

Following is a list of birds collected or seen near Pungo, Virginia, May 30 and 31, and June 2, 1936:

LITTLE BLUE HERON, *Florida caerulea caerulea*.—A colony of about fifty pairs of nesting Little Blue Herons was noted at Fentress, Virginia, in a pine woods bordering on a State highway, and some distance from any water. The nests were from fifteen to twenty feet from the ground, most of them containing young of varying sizes, some almost ready to fly. The local inhabitants informed me that the birds nested there for the first time in 1935.

BROWN THRASHER, *Toxostoma rufum*.—Thrashers were fairly common in the thickets among the sand hills, back from the ocean beach.

NORTHERN PRAIRIE WARBLER, *Dendroica discolor discolor*.—This warbler was fairly common in the thickets among the sand hills back from the ocean beach. The males were singing.

OVEN-BIRD, *Seiurus aurocapillus*.—Two were heard singing in the woods at Nimmo Church, near Pungo, where we also heard one in May, 1932.

MARYLAND YELLOW-THROAT, *Geothlypis trichas trichas*.—Yellow-throats were common in the thickets among the sand hills; one male was taken. This subspecies is, at Pungo, close to the southern limit of its breeding range.

**YELLOW-BREASTED CHAT, *Icteria virens virens*.**—Several were noted in the thickets among the sand dunes.

**BOAT-TAILED GRACKLE, *Cassidix mexicanus major*.**—Three single birds were seen along the beach south of Pungo; one was taken about two miles north of False Cape on May 31.

**FLORIDA GRACKLE, *Quiscalus quiscula aglaeus*.**—A flock of eight birds was seen following a plowman in an orchard; one male was taken on May 30. The only other record of the occurrence of the Florida Grackle in Virginia is that of five specimens collected by W. and H. H. Bailey in mid-May, 1895, at Newport News, and published by Chapman (Auk, vol. 52, p. 27, 1935).

**ALABAMA TOWHEE, *Pipilo erythrophthalmus canaster*.**—One of the most interesting results of our trip was the discovery that the breeding towhee of the southeastern corner of Virginia is the Alabama Towhee. The birds were numerous in the thickets among the sand dunes near the ocean beach. The three birds collected May 30 and 31, are of this race, two of them typical. This extends the known range of this subspecies considerably to the north, and is the first record for the State of Virginia.

**EASTERN HENSLOW'S SPARROW, *Passerherbulus henslowi susurrans*.**—Only four birds were seen, these in the dry meadows among the sand dunes back of the ocean beach. Certainly they were much less numerous than in 1932, when we visited the same locality. One female was taken on May 30.

**ATLANTIC SONG SPARROW, *Melospiza melodia atlantica*.**—Small numbers were noted among the sand hills back from the ocean beach. They appeared to be much less numerous than in 1932.

The list of birds taken or seen from the Virginia State Line to Oregon Inlet, North Carolina, May 31 to June 2, 1936, follows:

**NORTHERN BALD EAGLE, *Haliaeetus leucocephalus washingtoniensis*.**—W. B. Tyrrell, on June 1, examined a nest in a giant pine on Knott's Island that contained two large young.

**KING RAIL, *Rallus elegans elegans*.**—A pair of this species was seen on a roadway, crossing a salt marsh on Knott's Island, June 1. On firing a shot at them we found that we had killed the female and five young ones about two weeks old. This is of particular interest as another instance of the breeding of this species in a brackish environment.

**SEMPALMATED PLOVER, *Charadrius semipalmatus*.**—A few were seen at Oregon Inlet May 31 and June 1.

**BLACK-BELLIED PLOVER, *Squatarola squatarola*.**—Common on June 1 along the ocean beach in small flocks, mingling more or less with the smaller shorebirds. More than one hundred were noted, all moving northward.

**RUDDY TURNSTONE, *Arenaria interpres morinella*.**—Small numbers were seen along the ocean beach on May 31.

**AMERICAN KNOT, *Calidris canutus rufus*.**—Several flocks of knots were seen on the ocean beach, May 31, all moving northward. They would flush at some distance from the car and circle out over the surf.

**SEMPALMATED SANDPIPER, *Ereunetes pusillus*.**—Abundant along the ocean beach on May 31, especially at Oregon Inlet. During that moonlight night we could hear shorebirds calling as they flew overhead; but when morning came, all had departed for the north.

**HERRING GULL, *Larus argentatus smithsonianus*.**—Fairly common along the ocean beach, mainly immature birds.

RING-BILLED GULL, *Larus delawarensis*.—Small numbers were seen along the ocean beach.

LAUGHING GULL, *Larus atricilla*.—Common, especially at Oregon Inlet.

ROYAL TERN, *Thalasseus maximus maximus*.—Two seen at Oregon Inlet.

BOAT-TAILED GRACKLE, *Cassidix mexicanus major*.—Several were seen along the ocean beach near the Virginia line, also at Pine Island, and eight near Oregon Inlet, one of which was collected.

MACGILLIVRAY'S SEASIDE SPARROW, *Ammodramus maritima macgillivrayi*.—A good-sized colony was found on a dry marsh near Oregon Inlet and six birds were collected. They were nesting in clumps of *Juncus*. Their songs were shorter than those of other races of this species and lacked the trill at the end of the song.

All the specimens secured are in the Biological Survey collection, at the United States National Museum, and have been identified by Dr. Harry C. Oberholser.

*U. S. Bureau of Biological Survey*  
*Washington, D. C.*

## THE VIRGINIA RAIL IN MICHIGAN

BY LAWRENCE H. WALKINSHAW

*Plates 29, 30*

MICHIGAN, with its many lakes, small streams, hundreds of miles of lake front, and large areas of marshy shore line, together with small ponds and marshy areas in the interior, affords a wonderful place for nesting marsh birds. Among the commonest of the typical marsh birds is the Virginia Rail (*Rallus limicola limicola*) which may be found throughout the State.

## DISTRIBUTION

Barrows (1912) states: "This species is found over the entire state and probably nests wherever found. However, it is much more abundant in the southern part of the state than farther north." I have found it not uncommon on the Seney marshes, Schoolcraft County, and abundant in the Munuskong area, Chippewa County, of the Upper Peninsula. At Munuskong, Francis C. Gillett located two nests, the first for the Upper Peninsula, on June 4, 1934. Later in June, we located eight other nests and broods of downy young. During June 1935, I located four nests without much effort in the same marsh. At Seney, although I did not find any nests, several birds were observed and one displayed the 'broken-wing act' and must have had a nest or young very near. This same display was produced at Blaney, Schoolcraft County, when Dr. Christofferson and I were searching for the nest of the Ring-necked Duck (*Nyroca collaris*). In each case my dog helped to flush the birds.

In the Lower Peninsula the species is common on the Saginaw Bay marshes, the St. Clair marshes, the marshes along Lake Erie, in Monroe County; along the Kalamazoo River overflows near Lake Michigan, and occurs besides in large numbers in the Corey marshes, Clinton County, the Portage Lake and Mud Lake areas of Jackson County, and in a large marsh in Convis Township, Calhoun County, as well as in many other smaller marshes throughout the Lower Peninsula. Any large sedge- or grass-grown marshy region in Michigan probably contains a large number of Virginia Rails. Usually in the smaller swales and marshes there are only one or two pairs to be found. The borders of lakes and streams also afford small marshes for nesting.

## MIGRATIONS

The rails are very secretive in their habits, for their first appearance in the spring is not heralded with outbursts of song and their place of dwelling is such that few penetrate in search of them. Probably, therefore, a great deal



VIRGINIA RAIL'S NEST, W. K. KELLOGG BIRD SANCTUARY

*C. J. Henry, phot.*



VIRGINIA RAILS HATCHING; MUNUSKONG BAY, MICHIGAN



is yet to be learned about their early-spring, late-fall and winter distribution. With the aid of a good dog one can make closer and more accurate observations of distribution.

My notes show the earliest date of spring arrival during the past fourteen years on April 18, 1935. In years of normal temperatures for the latter part of April, the rails become most abundant during the very last days of April or the very first of May. Following is a list of the first and last dates for the Virginia Rail at Battle Creek, Calhoun County, Michigan:

<i>Year</i>	<i>Spring</i>	<i>Fall</i>
1922	April 30	.....
1923	April 29	.....
1929	May 4	Sept. 22
1930	May 11	Sept. 6
1931	April 30	.....
1932	May 8	Oct. 9
1933	April 25	Oct. 1
1934	May 6	Oct. 7
1935	April 18	Sept. 19

At Ann Arbor, Wood and Tinker (1933) over a period of twenty-five years have twelve records for the spring and three for the fall migration. Nine are for the last ten days in April, one for April 18, 1918, and two for later or in May. These as in my case are probably due to the fact that no one was in the field at the right place at an earlier date, or if there, could not flush the birds. The latest date is October 17, 1908.

Townsend (1926) gives a record for November 24, 1912, from Vicksburg, Michigan. This is an exceedingly late date, for the majority of the rails leave during the latter part of September or during the first half of October, depending upon the severity of the weather.

#### NESTING

During the past sixteen years I have found or observed forty-four nests of the Virginia Rail. The earliest was found on April 30, 1922, and the latest on July 31, 1920, from which the young hatched and left the nest on August 2 and 3. Another early date, estimated from the time the young hatched, was of a nest with ten eggs which hatched on or before May 27, 1935. Since the incubation period is twenty days, the last egg must have been laid on or before May 7 and the first on or before April 28. In several instances, recently hatched young have been observed during the latter part of July. A late nest was found by C. J. Henry at the W. K. Kellogg Bird Sanctuary on July 17, 1932. Another late date is of an adult with downy young observed by Dr. Josselyn Van Tyne (1923) on August 3, 1919, at Hassel, Michigan.

Undoubtedly these late dates are not of second broods, but nests follow-

ing previous failures to raise young. The majority of the nesting dates for the southern part of the State are between May 10 and May 30. In the Upper Peninsula the Virginia Rail nests most commonly between May 20 and June 10. Of twenty-four nests found in the southern part of the Lower Peninsula the dates of which were known or estimated, incubation began in five between May 1 and 10; in nine between May 10 and 20; in four between May 20 and 31; in three between June 1 and 10; none between June 10 and 20; in one between June 20 and 30 and in two the first half of July. Similarly, in the Upper Peninsula, nine dates fall between May 20 and June 10 and one between June 10 and 20.

The nests show a great similarity in both interior and exterior width, not varying more than twenty mm. in newer nests. As the nests become older the cupped part becomes more stretched and measures a little more. The average of sixteen nests was 12 by 12 cm. inside dimensions, and 15 by 15 cm. for outside dimensions. The nests vary in the depth to which they are cupped from 1 to 6 cm., averaging about 3 cm. They average about 14 cm. above the surface of the water to the rim at the time of beginning incubation. During incubation, however, this varies according to the amount of rainfall. The depth of the water also varies with the rainfall but for the period of beginning incubation, ranges between 10 and 25 cm. However, as in the case of the rainstorm of May 28, 1935, when 3.68 inches of water fell in twenty-four hours, this water depth may become very variable, and in many cases nests are flooded. At the first indication of rising water the birds immediately start to raise the nest by adding to the structure. During a heavy rainstorm I have watched the bird pull dead rushes into the nest and work them under the eggs. In this way the eggs are kept above the surface of the water in any ordinary rain. At other times, as during drought, the water may disappear entirely from the vicinity, and a nest which was in several centimeters of standing water when incubation started, may then be in a perfectly dry area.

The nests are made of whatever plants are closest and most convenient. If built among *Scirpus*, this constitutes the foundation, the rim and often the lining; or if some *Carex* is near at hand the nest may be lined with this finer sedge. If grasses are the chief plant about, the nest is made of them. Usually, but not always, the lining is of finer material than the exterior and foundation. Where the vegetation allows, the nest is usually arched over by a canopy of rushes or sedges. This canopy helps in locating many nests.

The nesting habitat varies according to the location. Along the Great Lakes there are extensive areas of rushes (*Scirpus validus*) which afford a wonderful habitat for the rails. In the interior of the larger marshes are extensive areas of sedges such as *Carex sylvaticus*, *Carex Bebbii* and others closely related, interspersed with cat-tails (*Typha latifolia*) and occasionally

## NESTS OF VIRGINIA RAIL

Nest No.	Date Found	Con- tents	Date last egg was laid	Date eggs hatched	No. of eggs in set	Location
1	May 30, 1920	9 e	Destroyed		9	Convis Township, Calhoun Co.
2	May 30, 1920	7 e	May 17 E	June 6	7	Convis Township, Calhoun Co.
3	May 30, 1920	6 e	Destroyed		6	Convis Township, Calhoun Co.
4	July 31, 1920	7 e	July 14 E	Aug. 2-3	7	Convis Township, Calhoun Co.
5	April 30, 1922	1 e	May 6	May 26 E	7	Convis Township, Calhoun Co.
6	May 14, 1922	9 e	May 14 E	June 3	9	Convis Township, Calhoun Co.
7	May 27, 1923	8 e	May 25 E	June 13-14	8	Convis Township, Calhoun Co.
8	June 3, 1923	8 e	May 26 E	June 13-15	8	Convis Township, Calhoun Co.
9	June 21, 1923	7 e	Destroyed		7	Convis Township, Calhoun Co.
10	May 25, 1929	10 e	Unknown	Unknown	10	Convis Township, Calhoun Co.
11	May 18, 1930	9 e	May 9 E	May 28-9	9	Convis Township, Calhoun Co.
12	May 16, 1931	9 e	Unknown	Unknown	9	Convis Township, Calhoun Co.
13	May 24, 1931	8 e	Unknown	Unknown	8	Convis Township, Calhoun Co.
14	July 17, 1932	7 e	July	July	7 <sup>1</sup>	W. K. Kellogg Bird Sanct., Kalamazoo Co.
15	June 4, 1933	5 y	May 15 E	June ? 4	x	Convis Township, Calhoun Co.
16	June 8, 1934	13 e	Unknown	Unknown	13 <sup>2</sup>	Munuskong State Park, Chippewa Co., U. P.
17	June 11, 1934	10 e	Unknown	Unknown	10 <sup>3</sup>	Munuskong State Park, Chippewa Co., U. P.
18	June 11, 1934	11 e	Unknown	Unknown	11 <sup>3</sup>	Munuskong State Park, Chippewa Co., U. P.
19	June 11, 1934	10 e	Unknown	Unknown	10 <sup>3</sup>	Munuskong State Park, Chippewa Co., U. P.
20	June 11, 1934	eggshells	Evidently destroyed		x <sup>3</sup>	Munuskong State Park, Chippewa Co., U. P.
21	June 12, 1934	2 e	Evidently destroyed		x <sup>3</sup>	Munuskong State Park, Chippewa Co., U. P.
22	June 12, 1934	7 e	June 14 K	July 3-4 E	9	Munuskong State Park, Chippewa Co., U. P.
23	May 9, 1935	5 e	May 12 K	May 31- K June 1	8	Bedford Township, Calhoun Co.
24	May 14, 1935	3 e	Destroyed		x	Bedford Township, Calhoun Co.
25	May 15, 1935	10 e	May 6-7 E	May 27 K	10	Ross Township, Kalamazoo Co.
26	May 16, 1935	3 e	May 20 K	June 8-9 E	7	Convis Township, Calhoun Co.
27	May 16, 1935	7 e	Destroyed		7	Convis Township, Calhoun Co.
28	May 16, 1935	8 e	Destroyed		8	Convis Township, Calhoun Co.
29	May 16, 1935	6 e	May 18 K	June 6-7	9	Convis Township, Calhoun Co.
30	May 18, 1935	2 e	May 25 K	Destroyed	8	Ross Township, Kalamazoo Co.
31	May 18, 1935	3 e	May 23 K	June 12 K	8 <sup>4</sup>	Ross Township, Kalamazoo Co.
32	May 19, 1935	9 e	Unknown	Unknown	9	Convis Township, Calhoun Co.
33	May 19, 1935	8 e	May 12 E	May 31, June 1 K	8	Convis Township, Calhoun Co.
34	May 21, 1935	3 e	Deserted with one egg broken			Convis Township, Calhoun Co.
35	May 26, 1935	7 e	Unknown	Unknown	7	Convis Township, Calhoun Co.
36	May 30, 1935	7 e	Unknown	Unknown	7	Convis Township, Calhoun Co.
37	May 30, 1935	9 e	Unknown	Unknown	9	Convis Township, Calhoun Co.
38	May 30, 1935	5 y	Unknown	May ? 29		Leoni Township, Jackson Co.
39	June 1, 1935	10 e	Unknown	Unknown	10 <sup>1</sup>	Corey Marshes, Clinton Co.
40	June 2, 1935	11 e	Destroyed		11	Munuskong State Park, Chippewa Co., U. P.
41	June 2, 1935	11 e	Unknown	Unknown	11	Munuskong State Park, Chippewa Co., U. P.
42	June 3, 1935	10 e	May 29 E	June 17-8 K	10	Munuskong State Park, Chippewa Co., U. P.
43	June 3, 1935	9 e	Unknown	Unknown	9	Munuskong State Park, Chippewa Co., U. P.
44	June 15, 1934	6 e	Unknown	Unknown	6	Convis Township, Calhoun Co.

K = known; E = estimated. <sup>1</sup> Nest found by C. J. Henry. <sup>2</sup> Nest found by F. C. Gillett.<sup>3</sup> Nest found by F. C. Gillett and myself.<sup>4</sup> Nest found by Wayne Tice

swamp loosestrife (*Decodon verticillatus*) and reed (*Phragmites communis*). At Munuskong Bay the rushes predominated but *Carex prairea* and *Eleocharis palustris* were to be found with it. Farther back where the Yellow Rails (*Coturnicops noveboracensis*) were found, the sedges were mostly of the genus *Carex* intermixed with grasses, often of the genus *Muhlenbergia*. Later in the summer one may find showy ladyslipper (*Cypripedium reginae*), calopogon (*Limodorum tuberosum*), water parsnip (*Sium cicutaefolium*), blue vervain (*Verbena hastata*), ferns, asters and goldenrods. Often some small bushes and shrubs may be found in the area or very near to it.

Nest no. 5 was visited on May 21 but the eggs had not hatched; and again on May 28, when the eggs had all hatched. Incubation period over fifteen days.

Nest no. 23 was the first nest checked very closely and a summary of the findings is as follows: May 9, about 6 a. m., five eggs; May 10, same; May 11, 7 a. m., six eggs; May 11, 8 p. m., seven eggs (parent incubating for first time); May 12, 5 p. m., eight eggs (bird incubating); visited regularly; May 29, five eggs pipped at 6 a. m., (not pipped night before); May 30, six eggs pipped at 6 a. m.; May 31, 5.30 a. m., one young still wet (egg no. 2); May 31, 5 p. m., six young, four escaped (egg no. 6 infertile), only egg no. 8 remained unhatched; hatched June 1. Incubation period twenty days.

#### WEIGHT OF EGGS

	May 11	May 29	Loss in grams	Percentage loss	Weight of young
1	9.7 grams	8.2 grams	1.5	15.4%	5 grams
2	9.6 "	8.2 "	1.4	14.5%	
3	8.7 "	7.27 "	1.43	16.4%	
4	9.5 "	7.9 "	1.6	16.8%	
5	9.5 "	7.9 "	1.6	16.8%	
6	8.3 "	7.2 "	1.1 (infertile)	13.2%	
7	8.0 "	6.9 "	1.1	13.7%	
8	8.9 "	7.3 "	1.6	17.9%	
Average	9.02 "	7.6 "	1.41 grams	15.9%	5.4 grams

Egg no. 8 weighed May 13 in first column, no. 6 not averaged in in column 4. Two other young were weighed but the eggs from which they hatched are not known. They weighed 5.4 grams and 5.8 grams, respectively.

Nest no. 27.—The eggs were destroyed by some bird, which did not take them all but left two, and a third with a bill hole in it.

Nest no. 31.—May 18, 6.30 a. m., three eggs. Nest was made of Large-toothed Aspen leaves, with not the least sign of lining. Later, gradually, this nest was lined with a few sedges but the aspen leaves showed through

the lining. May 22, 6.30 a. m., seven eggs and incubation had not started; May 23, 6.30 a. m., eight eggs, incubation started (one egg was accidentally broken).

From this date on, Durward L. Allen checked this nest for me until the young hatched. The following are his notes: June 6, 7, 8, 9, 10, 11, seven eggs warm; June 11, all eggs pipped; June 12, 6.30 a. m., all seven eggs still present; 5.45 p. m., all eggs hatched. Incubation period is therefore twenty days, the same as in nest no. 23.

*Nest no. 33.*—May 12, eight eggs when found; May 30, a. m., seven eggs pipped; May 31, erected blind at nest at 9 a. m., stayed until 11 a. m. Four young hatched that morning. No. 1 egg (weighed 10.7 grams, May 19), young weighed 8.1 grams; no. 4, weighed 10.0 grams May 19; 8.7 grams just an hour before hatching; the young weighed 7.5 grams; no. 6 egg weighed 10.35 grams May 19; 8.6 May 31; the young one weighed 7.5 grams. All of the eggs had hatched before noon except two, one of which was badly pipped.

*Nest no. 38.*—There were five young in this nest; all the eggs had hatched. On May 30 the water in this area had risen about a foot due to a rain of 3.68 inches on May 28. The nest was soaked and although the water level had dropped a little below the bottom of the nest, the old bird evidently had not brooded or incubated in it sufficiently to dry it out. Since this was late in the evening the old bird must have brought the young back to their old nest or to one of the extra nests which often are made near the original nest.

*Nest no. 42.*—Found June 3; eight eggs pipped June 15, a. m.; June 16, spent several hours in blind at nest; June 17, 7 a. m., first two eggs hatched. Both birds incubated eggs.

#### THE EGGS

In the nests which I have observed the number of eggs ranged from six to thirteen. In the Lower Peninsula, on the interior marshes, where all of the nests above described were found, the average number of eggs was 8.06 per nest in thirty nests which were known to have full complements, while for nine nests at Munuskong Bay in the Upper Peninsula, the average was 10.44, or 2.38 eggs more per nest than in those three hundred miles farther south.

Eggs were weighed at twelve nests, nine in the southern part of the State and three at Munuskong State Park. These weights in nearly all cases were taken near the beginning of incubation. Seventy-four eggs in the Lower Peninsula averaged 9.19 grams; fourteen eggs at Munuskong averaged 9.87 grams, but since most of these were from one set, it is hard to compare with the weights of the others. The lightest of eighty-eight eggs weighed 7.15 grams when newly laid. Another light egg weighed 8.0 grams

when fresh and 6.9 grams when pipped. The heaviest egg weighed 11.3 grams when fresh and 9.6 grams when ready to hatch. The lightest set of eggs, eight in number, averaged 8.28 grams when fresh; while the heaviest, eight in number, averaged 10.57 grams when fresh. Many Virginia Rails' eggs have previously been measured but in handling so many eggs in 1935 I measured 97, with an average of 32.34 by 23.49 mm.

The color has been described as "creamy-white" (Reed, 1904), again as "creamy white or pale buffy (ivory-yellow to pale vinaceous buff); spotted and dotted with reddish brown and vinaceous gray" (Dawson, 1923). Again as "pale buff, varying from 'pinkish buff' to 'cartridge buff' or nearly white. They are spotted—with 'hazel' 'russet'! 'cinnamon-brown' and 'army brown'" (Townsend, 1926). The spots are smaller than those on the eggs of the Sora, and occur over the entire surface of the egg, though chiefly condensed at the larger end. The eggs are ovate in shape.

Usually one egg is laid each day. However, in one nest (no. 5) eight eggs were laid in nine days. The usual time of deposition is during the first few hours of daylight, from 4 to 8 a. m.

#### THE YOUNG

The incubation period of the Virginia Rail for two nests followed from the beginning of incubation until the young hatched, was twenty days. Incubation started in the majority of cases the day before that on which the last egg was laid. In one nest (no. 31), incubation started the day the last egg was laid and the eggs all hatched during a period of ten hours. The eggs are pipped about forty-eight hours before they hatch. In the first thirty-six hours the young one seems to make little progress but finally loosens itself more and begins to cut the upper third of the egg until it has made almost a circle, then by pushing and straining it forces its way into the world, a breathing wet mass with black down over the entire body and head. In only a short time this down becomes silky and fluffy. There is a small claw about 1 mm. long on the outer digit of the wing. The bill is circled with a black band, about 1 mm. wide at from 1 to 2 mm. from the base. Near the tip of the upper mandible is the egg-tooth, conspicuously white on the light vinaceous-fawn-colored bill. The legs and feet are fuscous in color,—colors taken by Dr. Josselyn Van Tyne with Ridgway's 'Color Standards and Color Nomenclature' from specimen collected at Fish Point, Tuscola County, June 5, 1935.

As one approaches the nest during hatching time, the young leave soon after the adult flushes, clambering over the edge and either swimming away with jerky strokes through the neighboring rushes or hiding in some clump in the vicinity of the nest. Sometimes they become caught among the rushes or sedges and soon their *pee-eeep* betrays them. Some leave the nest

even before they are entirely dry and they are then more prone to get thus caught. When this occurs, I have seen the adult rush out from the vegetation, catch the little fellow by the nape of its neck, and rapidly dash back out of sight with the chick dangling from her bill. At such times the mate can be heard calling the other young to a spot remote from the nest, while, if one should enter a blind at the nest, the bird which had rescued the young would be seen to return and incubate the remaining eggs.

At night, when the young are first hatched, the adults bring them back to the nest where they remain during the cooler hours. Even as late as the middle of August, at dusk, I have flushed at least a single bird from an empty nest over water. These nests are often found among the sedges at this time of year and are often dry as though they had been in continuous use.

There is a small pond directly back of the barn on my father's farm. At about 6 a. m., on several mornings during the latter part of July, in the two years 1934 and 1935, an old Virginia Rail would bring a brood of downy young from the reeds about the edge of a pond and leading them, would cross close to the barn-yard, just back of the stables where milking was in progress, up to a neighboring field. One morning she led the brood of about eight young to the tool-shed door and even went under the door, calling from inside to the young, which soon followed her. For several minutes she stayed in the shed, then left for the neighboring wheat field. In 1934, the adult even led the young about the yard, at least a hundred yards from the nearest water.

In other places one may find them wending their way along some reed-grown brook to the different swales. Again, if one be lucky enough, when fishing some lake, he may observe the young one-half to two-thirds grown stalk out from the bordering loosestrife or rushes. In this case they usually appear singly. On other occasions, if several observers are together and one stands motionless while the others work back and forth across the marsh toward the one motionless, the latter may see the adult followed by various young, swiftly cross some open area nearby. Later in the summer, both Soras (*Porzana carolina*) and Virginia Rails and often King Rails (*Rallus e. elegans*) may be found together in certain areas before the autumn migration.

#### WEIGHTS AND PLUMAGES

Seven downy young were weighed when newly hatched and averaged 6.7 grams or 5.0, 5.8, 5.4, 8.1, 7.5, 7.4, and 7.5 grams, respectively. A juvenal female weighed on September 2, 1934, 99 grams. An adult female on April 28, 1935, 70.9 grams. Two males on September 2, 1934, and October 4, 1934, weighed 118 and 114 grams, respectively. Three other birds were captured

alive, two with the help of my dog, while the third was picked off the nest. These weighed 115, 94.55, and 92.8 grams, respectively.

Plumages of the adult Virginia Rail have been described many times. Following is a description of a young one about six weeks old: throat, white; buff band across upper breast; posterior to this in central part of belly, whitish; sides black, streaked with white; buffy on under tail-coverts; top of head, back and tail black with chestnut tips on a few feathers; wing chestnut or reddish brown, white at bend and black-and-white barred underneath; buff line over eye; dark region around eye; iris red; upper mandible dark above, with buffy tomentum; lower mandible buffy, black at tip; legs and feet deep copper.

#### VOICE

The Virginia Rail has many calls and grunts varying with the situation that arouses them. The young when first hatched and for several weeks have a quavering *pee-eeep*. At times when they are excited, this call becomes rather shrill. When separated by an intruder or enemy, the young scatter and as soon as stillness again reigns, their quavering *pee-eeeps* can be heard all about, together with the clucking of the parents as the group reassembles. On one such occasion, as I stood motionless with a brood of downy Virginia Rails about, the old one could be heard calling so softly that she could hardly be heard, a low *kik-kik-kik-kik* similar to the call of the Yellow Rail but much fainter. At this time the young began their steady peeping in answer and started to gather in her general direction.

Another call which I heard from a blind, as the adult called the downy young together was a low, *cluck-cluck-cluck-cluck-kuk-kuk-kuk* and still another, when the young all started toward it was *koo-koo-koo-koo-kooo-a*. A call heard several times when after disturbing the young all seemed well after I had vanished and they were all assembled again, was a rather loud call *buzz-z-z-z-zzz*, very much as a buzz-saw sounds at a distance when a large stick of wood is pushed into the saw. Another call uttered by the mate when the other is incubating is a low-pitched *kuk-kuk-kuk-kuk-kuk*, which near at hand is very loud. On one occasion an adult on the nest was heard to utter this call three times in answer to what seemed to be all of the rails in the marsh, both Soras and Virginias. From the action, it would seem to mean 'Everything is all right.' A call uttered commonly by the adult when a person approaches a nest or young, is a shrill *keeeee*. Another call more rarely heard is a quick *kid-ic-kid-ic*, which seems to mean 'scatter.'

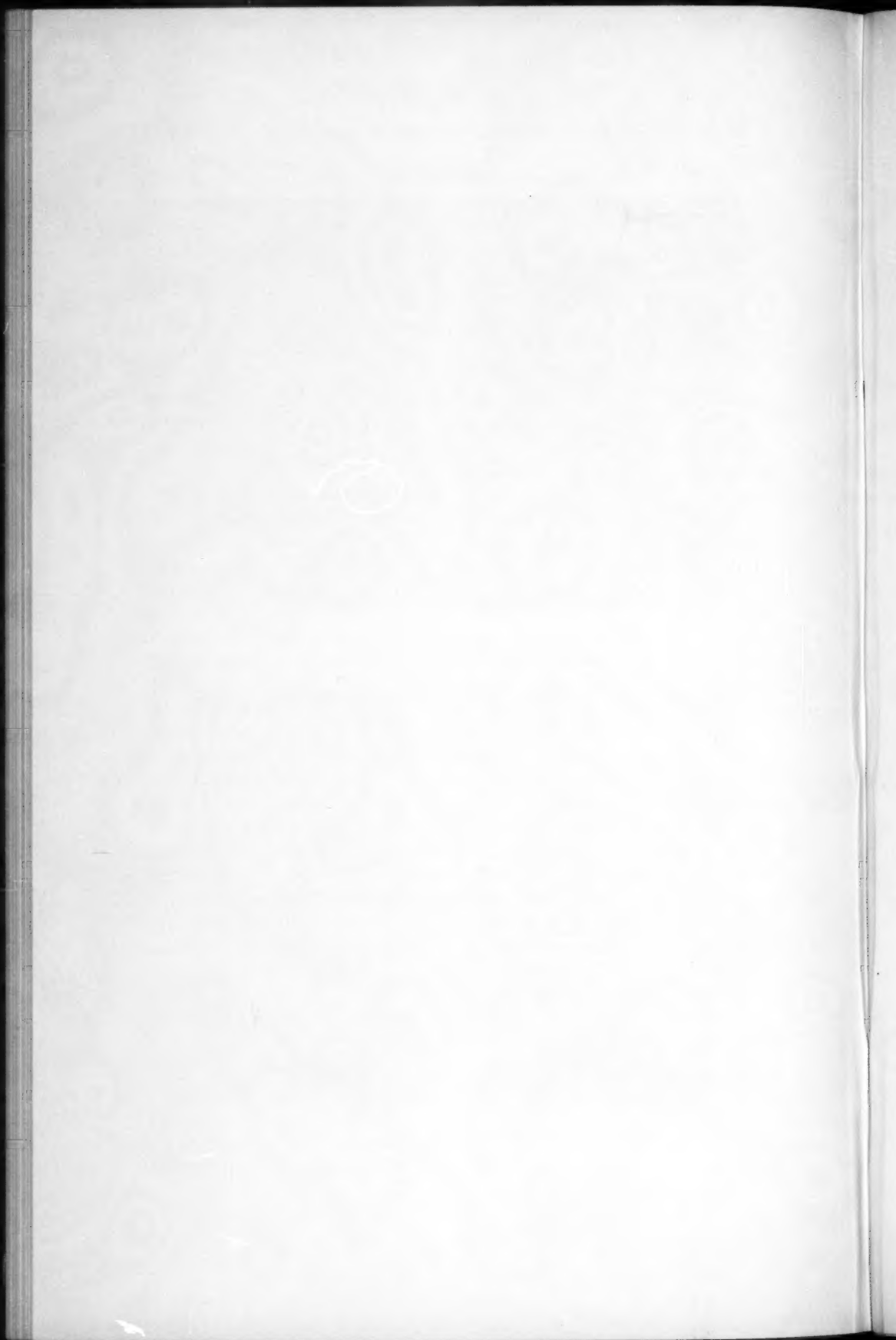
The regular song of the Virginia Rail can often be heard in the dusk from the depth of the marsh. To me it resembles, *kt-dic-kt-dic-kt-dic-kt-dic-kt-dic*. A. A. Allen (1934) gives a good interpretation of this as *ticket-ticket*.



VIRGINIA RAIL ON ITS NEST



TWO VIRGINIA RAILS AT THE NEST



## BEHAVIOR

At all times any of the rails in Michigan are very hard to flush. With the help of a dog I have flushed many, especially during the early spring when the going is easier for the dog. In fact at this season, during 1935, we flushed as many as seventeen Yellow Rails besides the larger numbers of Soras and Virginias. At times I have watched a Virginia Rail run along in front of the dog only a few feet from his nose then jump to one side and try to escape by standing motionless. On one occasion the dog worked the bird back toward me and it ran right into my hands. On another occasion I watched the bird 'freeze' and walked over and picked it up. This has been done also with Yellow Rails. I have picked both Virginia Rails and Soras off the nest. When the vegetation is high any of the rails is harder to flush and a dog may work in vain for hours, without flushing a single bird. One may consider himself fortunate to flush a rail by walking alone through rail habitat. However, if one stands motionless and watches closely where rails may be heard, he may see them stalk about among the sedges searching for food, or if sedges border a lake they may be observed by a motionless observer from a boat near the shore. They are very elusive birds. If one be fortunate enough to flush a rail, it flies only a short distance just over the rushes or sedges with dangling feet when it again depends upon its feet to escape. At times I have flushed them from fields, bordering marshes, where they must have been feeding.

## SOME OBSERVATIONS FROM BLINDS

On two occasions I have observed Prairie Marsh Wrens (*Telmatodytes palustris dissaëptus*) pecking at Virginia Rail eggs but in each case no harm was done, whether it was due to the fact that the birds were not strong enough to break the shells or because the adult rail returned too soon and frightened the Marsh Wren away.

At one nest, where the eggs were pipped, I erected a blind to watch the adults during hatching time. I entered the blind at ten in the morning, during a rainstorm, and within a period of twenty minutes the adult returned to incubate. After making several exposures I wished to photograph the bird as she entered the nest so tried to flush her by slapping the sides of the blind, then by rustling the rushes at the base of the blind, but without success. When I extended my hand toward the nest the parent fairly leaped at it when it was only a short distance away, pecking it severely, uttering as she did so a low grunting, hard to describe. [She (?) ran about the vicinity of the nest with drooping wings and was finally joined by her mate who uttered low grunts in answer to those she made, something like the clucking of an old hen but not nearly so loud. After a period of several minutes, the same bird returned to incubate the eggs and the other wandered off through

the rushes. At one o'clock he returned and with the same low clucking call approached the nest and climbed over the edge right beside the incubating bird and worked himself under her wing, examining the eggs as he did so. He left suddenly when the camera shutter clicked. At 1.20 p. m., I again heard the same low clucking and knew he was in the neighborhood. The mate raised her head, watching him as he approached. He repeated the same act as before and this time both birds left the nest to a distance of about four feet where they seemed to consult. The female left the neighborhood while the male climbed on to the nest to start incubating, but with difficulty covered the eggs. He was much more nervous than his mate and had a lighter line over the eye. Finally after many trials he got nearly all of the eggs underneath him and settled down to incubate as a hard rain came on, the hardest during the day. Rain came down in torrents, causing him to shake his head occasionally and to change his position so that he would cover the eggs on the other side where they were getting wet but at no time did he cover the entire ten eggs. Three times he called from the nest, once, in answer to his mate, and twice, in answer to all of the rails in that end of the marsh.

At 2.10 p. m., a low grunting or clucking sounded and the other bird appeared, very neat and trim, even though the rain had been falling very hard, and in marked contrast to the bird, wet and bedraggled, sitting on the eggs. She came to the edge of the nest, where apparently the birds were communicating for she dashed out across the marsh, looking first this way, then that when she spied what she must have been looking for and returned to give the male an insect, the nature of which I could not determine. But he did not want to incubate so dashed out across the marsh whilst she settled down to the task of incubation.

#### SUMMARY

The Virginia Rails arrive in Michigan during the latter part of April and leave for the South by the last of September or the first part of October. They have been found nesting from April 30 until August 3. Sets contain from six to thirteen eggs, more in the Munuskong Bay region of the Upper Peninsula than in the southern part of the State. The eggs are laid, as a rule, one each day, and are pipped for about forty-eight hours before hatching and all hatch within a period of twenty-four hours, as a rule, for incubation does not start until the day before or upon the day the last egg is deposited. The incubation period is twenty days. The young can swim and walk about almost immediately.

Analysis of plants was accomplished by the kind aid of the Botany Department of the University of Michigan Museum and by Mrs. N. T. Peterson of Battle Creek, Michigan. Many thanks must go to Dr. Josselyn

Van Tyne for help in checking this paper and for study of specimens in the Museum of Zoology, University of Michigan.

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## AUDUBON AND THE DAUPHIN

BY FRANCIS H. HERRICK

## I

WAS John James Audubon Louis Charles, Dauphin and Duke of Normandy, who by hereditary right became King of France in name, at the moment the head of his father, Louis XVI, fell under the guillotine in Paris, January 21, 1793? Was he the little boy prince, who was "in the way", and "not wanted" by his uncles and many of his countrymen, his potential subjects? Was he that unfortunate child who, orphaned by regicides, was held a close prisoner for three impressionable years of his young life? Was he the boy who, in consequence of such treatment, according to some reports, developed a tendency to scrofula, which we should now call tuberculosis? Finally, was he the ten-year-old boy who was officially declared to have died in the Temple prison, June 7, 1795, a conclusion which many historians accepted, although there is now strong evidence, as some think, that the true prince was spirited out of the Tower, but when or how, or where or how long he may have lived, are questions which have not yet been and perhaps never will be, answered with finality.

When everything is considered, these questions relating to Audubon can receive but one answer,—a decisive negative. I repeat them now only because they have been seriously asked, and incredible as it may seem, have been given a warm welcome by two recent biographers.<sup>1</sup>

Miss Rourke mentions a number of reasons which have led her to favor the fantastic Dauphin idea. The fact that Audubon was first called "Fougère," and later "Jean Rabin," while for a time he used the name "La Forest," is cited with suspicion. When Captain Jean Audubon finally returned from Santo Domingo to France, late in 1789, "how many children," she asks, "did he bring with him?" and, "if he was accompanied by a little boy, there is no certainty," she says, "that this was the same boy who was adopted as Fougère," in 1794. If this were not the same boy, neither she nor Mrs. Tyler know what became of the first, or have any proof that Audubon was a substitute child. There was a long period, says Miss Rourke, between Audubon's birth (April 26, 1785) and his adoption (March 7, 1794) of nearly nine years, and "this gap has never been filled in. Where was this boy during this time? It is well within the range of possibility that after his return to France during the Revolution, a boy was entrusted to the care of Captain Audubon whose identity he was induced to hide. He may have used the approximate birthday and later the name of the little

<sup>1</sup> See "Audubon," by Constance Rourke, New York, 1936, and "I Who Should Command All," by Alice Jaynes Tyler, New Haven, 1937.

boy born in Santo Domingo to cover the history of another child. Some of those closest to Audubon during his lifetime believed implicitly that he was of noble birth."

Miss Maria R. Audubon, the naturalist's granddaughter, stated to me in 1914 that Jean Audubon and his wife settled some property upon "Jean Rabin, créole de Saint-Domingue," which he refused to accept under that name, saying, "My own name I have never been permitted even to speak; accord me that of Audubon, which I revere, as I have cause to do." This reference to property probably has to do with the wills of his father and stepmother, in which the objectionable name occurs many times. Audubon's dislike of the Rabin name does not seem to have persisted, for in view of the settlement of property under those wills, on July 25, 1817, a power of attorney was drawn in favor of his brother-in-law, Gabriel Loyer du Puigauveau. In this curious document the naturalist refers to himself as "John Audubon," and as "Jean Rabin, husband of Lucy Bakewell," the Jean Rabin *alias* occurring four times in the text over the signature of "John J. Audubon" at the end.

An English reviewer once expressed regret that I had probed the birth and parentage of Audubon, saying that he preferred to take this illustrious man at his word that he "belonged to every country." Such writers forget that a prime duty of every biographer is to make his subject known, and that this is impossible if he comes from nowhere, or as John Neal facetiously remarked, if he is "one of those extraordinary men who are erected,—never born at all." Audubon's father "had other reasons," thinks Miss Rourke, "for sending Fougère to America which he did not disclose. . . . They could not have had to do with money. . . . Whatever his reasons were they persisted, and may have had to do with the boy's parentage."

Mrs. Tyler begins her book with a quotation: "History has the inalienable right to be written correctly," to which every honest person will subscribe, but which writers of biography are too prone to forget. Throughout her book she refers to me as "Robert," a praenomen I have never borne, but since names are easily confused, I forgive her. The naturalist's father is usually referred to as "Admiral Audubon," which gives a sense of unreality to her text, as the highest rank which Jean Audubon attained in the navy was lieutenant (*lieutenant de vaisseaux*), one grade below that of captain. In my 'Life of Audubon' I gave a summary of the naval career of his father in the merchant marine and navy of France, as recorded in the official records of the navy department in Paris. Jean Audubon held the rank of lieutenant from October 11, 1797, until his retirement for disability January 1, 1801. Perhaps Mrs. Tyler followed the example of Miss Maria R. Audubon, who was accustomed to give this exalted rank to her grandfather, and perhaps she got it from a letter that Audubon carried with him

when leaving Edinburgh for London, written by Mr. Hay, and addressed, March 15, 1827, to his brother, Robert William Hay, Downing St., West, and in which the following occurs: "Mr. Audubon is a son of the late French Admiral Audubon, but has himself lived from the cradle in the United States, having been born in one of the French colonies." Audubon certainly should have known his father's naval rank, and also that he himself could not have lived from the cradle in the United States, but the last statement is now believed to have been true.

Strong presumptive evidence had led me to conclude that John James Audubon was the illegitimate son of Lieutenant Jean Audubon and Made-moiselle Rabin, a French créole of Santo Domingo. "Rather than tolerate the suggestion of illegitimacy in regard to their grandfather," says Mrs. Tyler, "the old ladies decided to bear the rigors of publicity, if needs be, and to give to the world the information which would disprove this biography.<sup>1</sup> To that end they released me from the promise to withhold publication of their 'secret,' and perhaps the world's secret also." This family secret of Audubon's noble birth, which is revealed in Mrs. Tyler's 'I Who Should Command All', was imparted by the naturalist in letters to his wife, and in his Journals, which were written for her benefit, and for her alone, but with no thought of their publication. The significant passages were copied by his granddaughter, Miss Maria R. Audubon, into a little black notebook, which I was permitted to see in 1914 but, out of respect to her wishes and those of her sister, Miss Florence Audubon, they were only briefly referred to in my 'Life' of their grandfather in 1917. In the course of our conversation Miss Audubon confessed that she had really never known who her grandfather was, but that in the light of these journal entries she had come to think that he might have been the lost Dauphin. In commenting on this question Miss Audubon added that a gentleman, to whom these extracts had been shown, said that possibly they had been written to obscure the unwelcome fact of illegitimacy, a wise remark, as the sequel seems to have shown. I then tried to dissuade Miss Audubon from her expressed intention of destroying the original manuscript, but to no avail.

The entries in this notebook, which form the basis of Mrs. Tyler's 'I Who Should Command All,' have recently been published by Stanley Clisby Arthur<sup>2</sup> in his fair-minded, detailed and altogether excellent biography. Mrs. Tyler says that I have not recorded one biographical event between the year 1794, the year of Audubon's adoption, and 1800, the year of his baptism, and tries to put young Audubon in "Selkirk's Settlements," in

<sup>1</sup> See 'Audubon the Naturalist: A History of his Life and Time'; in two vols., New York, 1917.

<sup>2</sup> See Stanley Clisby Arthur; 'Audubon: an Intimate Life of the American Woodsman,' New Orleans, 1937.

Canada, at some time during these early years. All of these questions will be taken up a little later.

## II

In 1914, at the very outbreak of the World War, a great flock of documents pertaining to Lieutenant Audubon and his family was discovered at Couéron, the seat of his country villa in France. Outstanding among them was a curious bill of Jean Audubon's family physician, Doctor Sanson, of Les Cayes, Santo Domingo, covering a period of nearly three years, from December 29, 1783, to October 12, 1786. It was accepted and signed by Captain Audubon, and receipted by the doctor, when paid on June 7, 1787. This is particularly remarkable in recording the birth of a child to "Mlle. Rabin" on April 26, 1785. The inference, supported by other documentary testimony, was that this was the identical child, who later became known as John James Audubon, and the preponderance of evidence in favor of this conclusion is even stronger today.

Jean and Anne Moynet Audubon appeared in the town hall at Nantes, on March 7, 1794, and declared that they did "adopt and recognize from this moment as their lawful children to wit: a male child, named Fougère, born since their marriage . . . to him, Jean Audubon, and a woman living in America, who has been dead about eight years, and a female child, named Muguet, born also since their marriage aforesaid, to him and another woman living in America, named Catharine Bouffard, of whose fate he is ignorant.

"The two children being present, the first aged nine years, that will expire on the 22d of next April, the second aged seven years, that will also expire on the 26th of April next, and both having been born in America, according to the declaration which the witnesses above mentioned have signified as true, I have drawn up the present act, which the natural father and the mother by adoption, as well as their witnesses have signed, together with myself in this said day and year."

Fougère or Jean Rabin was baptized, as Jean Jacques Fougère (Audubon) on October 23, 1800, and the act was signed by Tardiveau, priest of St. Similien Church.

The Jean Rabin alias was used in the six wills drawn by Jean Audubon and his wife between the years 1812-21, and by Audubon himself in the power of attorney to which I have referred. It is these various legal documents bearing upon Audubon's birth and parentage, which Miss Rourke and Mrs. Tyler set aside as "not proven," yet they do not hesitate to place Audubon at the foot of a long list of spurious claimants to being the son of Louis XVI and Marie Antoinette, without a shred of documentary support to such a claim, excepting the family tradition, based upon extracts from letters and journals intended by Audubon for the perusal of his wife alone.

## III

It is generally assumed that the person, whose parents are not living, knows more about his early history than anybody else, and this is commonly true, except in the case of a child's early adoption, substitution, or abandonment by its true parents. What Audubon said publicly or privately about his birth, his age, and his parents, forms a mystifying record. According to Vincent Nolte, Audubon, after parrying some prying questions about himself in 1811, admitted that he was a Frenchman by birth and a native of La Rochelle. Joseph Robert Mason, youthful companion of Audubon on his famous journey down the Ohio and Mississippi Rivers in 1820-21, and who was closely associated with him for twenty-one months, told John Neal fifteen years later that Audubon had repeatedly represented to him that he was born in Santo Domingo.

Audubon's journal record of this journey, which I was permitted to examine rather cursorily twenty years ago, was published in 1929, and is commented on quite profusely by Stanley Clisby Arthur. While fortunate in escaping the fire and general mutilation by injudicious hands, this record has been tampered with at one critical point, in the entry of November 28, 1820, where Audubon spoke of his birth and parentage, and related incidents which he thought that his family in the future might wish to know. The mutilator of his text, however, as Mr. Arthur observed, did not succeed in forever obscuring what it was intended to conceal. In the two lines at this point, which have been blotted out as effectively with a pen as could have been done with an ink-filled brush, we can reasonably infer that Audubon gave his own mother's name, and either stated or implied that he was born out of wedlock, and in Santo Domingo. This inference is justified by the addition through the medium of another's hand and another kind of ink of the prefix "re" to the word "married" in what immediately follows the blotted lines. This, as originally written, reads: "My Mother, who I have been told was an extraordinary beautiful Woman, died shortly after my Birth and my father having married in France I was removed thereto when only Two Years old and received by that Best of Women, raised and cherished by her to the utmost of her Means . . ." Now, it is evident that the person, who obliterated those two lines and changed "married" to "remarried," was determined to make it appear that Captain Audubon had been first married to his boy's mother, but that after her death he took their child to France, where he married again, and this time to the woman who became the boy's stepmother, when the truth, as Audubon had evidently stated it, was quite the opposite.

A few years later, about 1824, when Audubon and his wife were living at 'Beechwoods', a plantation near St. Francisville, Louisiana, the wife of his old friend and former clerk, Dr. Nathaniel Wells Pope, left a record of her

reminiscences, quoted by Mr. Arthur, in which she said that Audubon had often described to her the cottage in which he was born, that was situated on the banks of the Mississippi River in Lower Louisiana and surrounded by orange trees.

At Oxford, in 1828, a lady who wanted his autograph, asked Audubon to write his name and the date of his birth. The latter, he said he could not do, "except approximately," and his hostess "was greatly amused that he should not know."

As I have already noticed, Audubon appears to have told Mr. Hay, of Edinburgh in March, 1827, that he was born in "one of the French colonies." In the introduction to the first volume of the '*Ornithological Biography*,' Audubon, who was under no necessity of saying anything about his birth, made the vague affirmation: "I received life and light in the New World," and continues: "When I had hardly yet learned to walk, and to articulate those first words always so endearing to parents, the productions of Nature, that lay spread all around, were constantly pointed out to me"; and in the biographical sketch, "Myself" he wrote that "the first of my recollective powers placed me in the central portion of the city of Nantes, on the Loire River, in France." How do such statements support the theory that J. J. Audubon was the lost Dauphin, or suggest the palace at Versailles, where Louis Charles was born, with forty or more servitors around him with assignments mainly directed to the care of this little boy, not to speak of his later governesses, tutors or teachers?

In the biographical sketch just referred to, supposed to have been written about 1835, and which, though edited by his granddaughter, is replete with palpable errors, he wrote that "the precise period of my birth is yet an enigma to me." He then spoke of his father going from Santo Domingo to Louisiana, and there marrying a Spanish lady of beauty and wealth, and of having three sons born to them, "I being the youngest of the sons, and the only one who survived extreme youth. My mother, soon after my birth [implying that he was born in Louisiana], accompanied my father to the estate (sic) of Aux Cayes, on the island of Santo Domingo, and she was one of the victims of the ever-to-be lamented period of the negro insurrection of that island."

The evidence now available from a variety of sources as already stated, points clearly to the fact that the mother of Audubon was a French créole, Mademoiselle Rabin, native of Santo Domingo, where her children were all born, that she was not married to Audubon's father, who stated under oath in the bill of adoption that the mother of his son had died "about eight years" prior to March 7, 1794 (the date of the signing of the act) that is in 1786, or one year after 1785, the year of the birth of the child born to Mlle. Rabin, as recorded in the Sanson bill, the later entries of which prove her to have been in declining health.

In various extracts from Audubon's journals, written for the benefit of his wife, but not for the public, at various times from 1826 to 1828, chiefly at Edinburgh and Paris, he records a visit from the Countess of Selkirk, speaks of his high birth, of walking the streets of Paris like a common man, when he "should command all," of his hated uncle, "Audubon of La Rochelle," and speaks of the oath under which he was bound not to reveal his identity. The name of the Dauphin, or of Louis XVII, does not appear in any of these excerpts, but the reference seems to be clear.

It should be remembered that when the Dauphin and his mother were separated in the Temple prison on July 3, 1793, Louis Charles was in his ninth year, and that the boy was nearly eight years old when his father was executed, so that their son had the memory of several years of both his parents, to whom, according to the testimony of all who had known them, he was devotedly attached.

Mr. Arthur speaks of Miss Harriet Bachman Audubon, daughter of John Woodhouse Audubon by his first wife, telling how she had read in her grandfather's journal one significant sentence: he made reference to "my father, meaning Jean Audubon,—and in the next sentence said 'my own father whom I saw shot.' He said 'shot' because he was only eight years old and the word 'to guillotine' was not then invented." Miss Audubon was evidently promoting the idea that the naturalist's 'own father' was Louis XVI, and that her grandfather was, or had been, the Dauphin, but if there is any truth in the quotation it would definitely prove that J. J. Audubon could never have been the Dauphin, because the execution of Louis XVI was not witnessed by any member of the royal family.

When writing to Bachman in 1832, Audubon gave his own age as forty-seven, which would imply that he was born in 1785, and this would agree with the date of the child born to Mlle. Rabin, as noticed in Dr. Sanson's bill. In writing to Bachman again six years later, on April 14, 1838, Audubon speaks of his being then fifty-three years old, which would again point to the same birth date.

In a letter to his wife, written from New Orleans, in 1837, as noticed by Mr. Arthur, he spoke of that town as "my natal city"; and the local newspapers of that time hailed Audubon as a native of Louisiana. Moreover, Cuvier, in his report on "The Birds of America" to the Royal Academy of Sciences of Paris, September 22, 1828, made the same statement, which in this case could have come only from Audubon himself; and when Audubon sailed for the United States with Rozier in 1806 his passport indicated that he was born in New Orleans.

Those committed to the Dauphin theory see in Audubon's features a strong Bourbon likeness, but such fancied resemblances never carry much

weight. Rev. John Halloway Hanson,<sup>1</sup> the biographer and protagonist of Eleazar Williams, was certain that this half-breed Indian was an aristocrat for he had the Bourbon features from top to toe. To many, perhaps, it would seem strange that J. J. Audubon should have found so close a resemblance between himself and Jean Audubon unless his father by adoption were his "real father." When writing in 1820, Audubon said that "Major Croghan of Kentucky told me often that he [Jean Audubon] looked much like me [and he] was particularly well acquainted with him". In the "Myself" sketch he also said: "In personal appearance my father and I were of the same height and stature, being about five feet, ten inches, erect and with muscles of steel. . . . In temper we much resembled each other also."

One day in October, 1826, when Audubon returned to his rooms in Edinburgh, and looked into a mirror, he saw not only his own face, but "such a strong resemblance to that of my venerated father that I almost imagined that it was he that I saw; the thoughts of my mother came to me, my sister, and my young days,—all was at hand, yet how far away." This does not sound like a Dauphin speaking; and it is doubtless true that comparisons drawn between the living or memories of the living are more significant than those based upon engravings or reproductions of old paintings.

In writing to young Spencer F. Baird in 1842, Audubon expressed the curious, if purely fanciful, idea that his mother once lived at "Mill Grove," near Morristown in Pennsylvania.

The foregoing record probably does not exhaust all the possibilities, but it is amazing enough, and partly explains why John Neal so often taunted Audubon for having had as many birthplaces as the poet Homer. A remarkable fact about most of these statements is that they come to us secondhand, that is from private letters and edited journals, the quotations from the 'Ornithological Biography' being the only ones that were published under Audubon's own signature. It would seem to be obvious that Audubon was determined that the facts concerning his birth and parentage should not be made public, and that to achieve this end he resorted to enigma, as the best available smoke-screen. If he thought that public knowledge of those facts would have been a stumbling block in his own career, and in that of his two sons, whom he once said he hoped might rise to eminence, he was indubitably right, for strange as it may seem, and unjust as it certainly is, the stigma of illegitimacy has always been a penalty which the public is ever ready to place on the head of the innocent. What strangers or what his intimates knew about those family matters is what Audubon was willing to

<sup>1</sup> Author of 'The Lost Prince,' New York, 1854. With this book, said William W. Wight, the habit began of referring to Louis XVII as "lost" as if he had been mislaid or hidden. "He was 'lost' only in the sense that he died." Hanson's mother was a daughter of a younger brother of Oliver Goldsmith, the poet.

tell them, and his own record seems to show plainly enough that he preferred to bear the taunts of the uncharitable than to face the reality.

## IV

"One of the great miracles of history would have occurred," writes Miss Rourke, "if Audubon were the lost Dauphin, but this is nothing against the idea." True enough, but the same could be said of Eleazar Williams, or any one of the numerous pretenders. If there were solid, unmistakable evidence to support this conclusion, I would be only too glad to accept it, but the presumptive evidence is all the other way. The theory is too weak to stand on its own feet.

"Some of those," says Miss Rourke, "closest to Audubon during his life-time, believed implicitly that he was of noble birth." This is, no doubt, very true, but Audubon said many things at different times to different persons that contradict any such idea, as that he was born in the New World, that his first memories were of Nantes, or that the only mother he had ever known was his stepmother. Thus in forming a judgment, independent of all domestic partiality, we seem to be thrown back upon those legal, family documents, which were drawn up before the youth was grown to man's estate and was obliged to fight his way in a hostile world.

"There was a gap," Miss Rourke thinks, "of nine years between Audubon's birth (April 26, 1785) and his adoption (March 7, 1794), which has not been filled in. Where was the boy during this time?" The evidence is fairly conclusive that Jean Audubon took his son to France late in 1789, so that this "gap" is reduced to about five years, and it seems to me that in his 'Ornithological Biography' and the "Myself" sketch he has filled this interval quite well enough himself. In the latter he spoke of "being constantly attended by two black servants, who had followed my father from Santo Domingo to New Orleans and afterwards to Nantes." Mrs. Tyler says that "it can be only mental inertia which has allowed hundreds of intelligent people to read this sentence, and not press the inquiry why the illegitimate son of a common, seafaring captain of Nantes should have been *constantly attended* by one or two black servants." But what shall be said of the mental condition of the people who read the opening sentence of the same paragraph about Audubon's first recollective powers placing him in the central part of the city of Nantes? If that statement was literally true no one could ever contend that Audubon was the lost Dauphin. Moreover, one would think that a household with an active boy rising five years (in 1790), and a girl rising three, could keep any two black servants on their toes for a good long time. Audubon did not mention his little sister Rosa, but there is no reason to suppose that he monopolized all the attention of those black servants.

In 1789, Jean Audubon had jumped from the frying pan of Santo Domingo into the revolutionary fires that were then sweeping France. At Nantes he became an ardent revolutionist when his city was entering the most terrible years of its history. It withstood a determined siege by the loyalists of La Vendée under Charette, and a reign of terror under Jean Baptiste Carrier, whose recall on February 14, 1794, just twenty-one days before the act of the adoption of his children was signed, had given him and his fellow citizens the first respite they had enjoyed in a considerable time. At Nantes, Captain Audubon had occupied a number of different houses during an interrupted residence of many years; and he continued to live there with his family until his retirement from the navy for disability, January 1, 1801, when he settled at his country villa, "La Gerbetière," at Couëron, on the right bank of the Loire, nine miles down the river.

During this earlier time, up to his sixteenth year, young Audubon had received little regular schooling, but had enjoyed a good deal of desultory experience in natural history and drawing. Thereafter, from 1801 to 1803, when he first returned to America, and for a part of a year, 1805-06, when he was at Couëron, aside from slight digressions, he was roaming the countryside and making a collection of his own drawings of the native birds. According to his own account of these formative years, he received a plenty of good advice, criticism and admonition from his father, and it was at Couëron that Fougère first met Dr. Charles d'Orbigny, who might be called his father in natural history. For my part I do not see the need of doubting the identity of the youth, whose life we have briefly followed from 1789 to 1803. If this was Audubon, who up to his eighteenth year had spent nearly five years in Santo Domingo, eleven years in Nantes, and parts of two years at Couëron, where does the Bourbon prince enter the picture?

Miss Rourke thinks that Lieutenant Audubon did not tell all of his reasons for sending his son to the United States, and that "whatever his reasons were they persisted, and may have had to do with the boy's parentage." This may be true, but what the father did not tell, the son apparently did. In writing to Miers Fisher in 1803, and to Francis Da Costa in the winter of 1804-05, Lieutenant Audubon expressly said that the compelling reasons for sending his son to America at that time were to enable him to learn English and enter trade. "Remember, my dear Sir," the elder Audubon wrote, "I expect that if your plan [with the lead mine] succeeds, my son will find a place in the works, which will enable him to provide for himself, in order to spare me from expenses which I can with difficulty support." If young Audubon had been the Dauphin or the legal king of France, is it at all probable that Lieutenant Jean Audubon, but recently known as such an ardent revolutionist, would have been selected to guard this scion of royalty, and then out of his own slender purse be expected to meet all the costs of sending him to America and of keeping him there?

There was, to be sure, another reason why the retired sailor and soldier wanted to get his son, Fougère, out of France at that time, though he may not have wished to write it. The young man was eligible for conscription. The need for "cannon fodder" was soon to become acute all over France, for Napoleon became emperor in 1804. Audubon told the secret at a much later time when on the Ohio River, November 26, 1820. "The conscription," he wrote, "determined my father on sending me to America," and he added, "a young man of seventeen [eighteen], sent to America to make money, for such was my father's wish."

## V

In his journal of March 15, 1827, at Edinburgh, Audubon recorded a visit from the Countess of Selkirk, when he thought it strange that she should call upon him. "Did she know, I wonder, who I am positively; or does she think that it is John J. Audubon, of Louisiana, to whom she spoke?"

On October 9, 1828, according to Mrs. Tyler, Audubon wrote: "How often I thought that I might once more see Audubon of La Rochelle without being known by him, and try to discover if my father was still in his recollection, if he had entirely forgotten Selkirk's Settlements." In my version of this entry there is no 's' at the end of the last word. The vagueness which the plural number seems to impart, makes a difference in our interpretation, but not a whit with reference to the Dauphin question. This entry concludes: "and if . . . if I say a few words more I must put an end to my existence, having forfeited my word of honor and my oath." This reference to Lord Selkirk, who had been much in the public eye in England for nearly ten years prior to his death, and for many years thereafter, is the tenuous thread on which Mrs. Tyler builds an amazing superstructure. "It would appear," she says, "that John James Audubon was, at sometime a member of Selkirk's Settlements in Canada." She writes: "The long suspense is over! At last we know the reason for Admiral Jean Audubon's abnormal solicitude, which took the form of the constant attendance of those black servants, who guarded John James Audubon, the supposedly illegitimate son of the rough sea captain of Nantes! That little nine year old boy, adopted by Jean Audubon on March 7, 1794, was a personage whose real identity might presumably be recognized by the wife of the Earl of Selkirk. The wife of the Earl of Selkirk had apparently known him personally when he was a settler in Selkirk's Settlements. It is not likely that the Earl's wife habitually met the rough colonists sent out to the wilds of North America, unless by chance one of those colonists was not a real settler, but was a personage emigrating under this guise in order to hide his identity, and to seek the protection of the Earl's remote colony. If the Earl of Selkirk were hiding a person of importance in his Settlements

in the Hudson Bay country, very probably the Earl's wife met that person before embarkation; or perhaps she gave him hospitality in her home, as was common in those days when England was the first destination of terror stricken French refugees.

"And that other *Audubon of La Rochelle*, who apparently had been with him in Selkirk's Settlements, was he the person who had been entrusted to convey and guard that little boy of eleven years, on the long perilous journey to Hudson Bay?" Mrs. Tyler seems to have confused Hudson Bay with the Hudson's Bay Company, which drew its furs from a vast region, but none of Selkirk's Settlements was anywhere near Hudson Bay.

Audubon's claim that he was bound under a solemn oath to his father not to reveal his own identity, Mrs. Tyler thinks, explains many things about the early history of Audubon the naturalist. "Does it not explain why the wily old sea captain, Jean Audubon, adopted *two* children on the same day, to give a semblance of paternity to both acts? And does it not suggest why he registered the name of the mother of the girl, and omitted to register the name of the mother of the boy, whose recorded age almost paralleled that of Marie Antoinette's son, who had vanished from The Temple just forty odd days before the date of this adoption?"

It is my opinion that Jean Audubon, who was only *fifty* years old in 1794, and was then just getting a breathing spell after perilous times, knew what he was talking about, that he was no perjurer, and was perfectly honest in every statement sworn to and witnessed in this act of adoption. That he was a few days out in his memory of birth dates is not important. There is positively no evidence that he failed to mention the mother of his son in order to conceal the woman's name. The surest way of doing this would have been to use a fictitious one.

Mrs. Tyler reproduces the title of a book on the Red River colony, which she says "serves to prove that Selkirk's Settlements were preeminently suited for the purpose of hiding the little King of France far from a world on fire with his pursuit. . . . And the by-products of this place of concealment were to exceed in importance to the world, even his physical survival. The germinating genius of this growing boy, which straight through life seemed to flower under adversity, was born of this forest life and intimacy with primeval nature.

"It would be natural for Admiral Audubon to turn his eyes to those North American outbounds of civilization, which he had so extensively traversed, were he casting about to find asylum for his adopted son after Charette's death. . . . Something had to be done to get that little boy out of danger, and so completely out of reach of Carrier's followers that pursuit would be absolutely impossible. Nor would distance alone provide sufficient protection. Secrecy must again be invoked, and masquerading

under some impenetrable guise. Selkirk's Settlements provided both requirements."

Mrs. Tyler even charts the course which she thinks Louis XVII, masquerading as John James Audubon, had taken in travelling from Nantes to the wilds of Canada: to England "the first destination of so many French refugees, Saint-Domingue, Admiral Audubon's former home; and probably from there to New Orleans, and up the Mississippi to the Settlements."

"The name *La Forêt*, [or *La Forest*,] which Audubon assumed, and which has never had any explanation, probably dates from this period. It may be the name under which John James Audubon was known as a Selkirk Colonist. . . . This name was probably dear to her [Mrs. Audubon], because she was the only person in Audubon's life, who knew about his Canadian sojourn.

"This thesis, if true, provides the explanation for so many inexplicable elements in the life of John James Audubon, that it is with a distinct sense of relief that I offer it as a working hypothesis, in the light of these letters. For, as I have said, no amount of wandering around the countryside of Couëron could have fitted this adolescent boy, John James Audubon, for his future life, and transformed him into one of the most powerful, resourceful woodsmen the new world possessed.

"And yet when John James Audubon came to the United States in 1803, when he was barely eighteen years of age, he could traverse the continent alone like an Indian, find his way through trackless forests, swim swollen rivers, shoot with the marksmanship of the wilderness, and he could survive with his naked fists in the primeval forest of North America. His contacts with the Indians had the sure touch of easy familiarity; his knowledge of wild life knew no bounds.

"Where had John James Audubon acquired this forest training? It is my belief that John James Audubon acquired all his forest training in the Selkirk's Settlements, somewhere between 1796 and 1800."

What an extraordinary picture we have here of the boy 'king,' whose sister once said that if he had actually escaped from the Tower prison, he could not have lived long on account of his weakened condition; hidden for a time in the heart of Nantes, under the roof of one who was, or had been, an ardent revolutionist, adopted by this very man, Jean Audubon, in place of his own son,—about whose fate no one of the writers quoted seems to have thought it necessary to inquire,—taken secretly to England, where Mrs. Thomas Douglas, later to become the Countess of Selkirk, opens her heart and home to him. Then a mysterious uncle takes him to Santo Domingo, thence to New Orleans, and up the Mississippi River to that vague destination called "Selkirk's Settlements" where the boy 'king' first learned his Indian lore and woodcraft. It is sad to relate that this ingenious picture

bears no resemblance whatsoever to reality. As a "working hypothesis" it fails to work. There is not an essential line or word of truth in it, not one! It cannot be true in any particular, since in the period of 1796 to 1800, which Mrs. Tyler is endeavoring to fill, there were no Selkirk's Settlements in existence, and none indeed before 1803, when young Audubon was leaving France and heading for his father's "Mill Grove" farm in Pennsylvania.

The Scottish nobleman, Thomas Douglas, the fifth Earl of Selkirk, did not come into his title and fortune until the death of his father in 1799. He was a patriot who gave his fortune and himself for the development of the British Empire by laudable means, his great aim being to turn the flow of Scottish colonists from the Carolinas and New England to Canada. He sponsored three settlements, the first in 1803 on Prince Edward Island, which was eventually fairly successful. The second, named "Baldoon" after a village on his ancestral acres, was situated in the western peninsula of western Canada, between Lakes Huron and Erie, and never became more than a straggling pioneer village before it was finally plundered by Americans in the War of 1812.

"The Selkirk Settlement" of the Red River was undoubtedly the one to which Audubon referred, and about which every reader of newspapers in England must have heard in the second decade of the last century. Its notoriety was due to its vast area, the money at stake, and the numbers of people involved. The legal battles fought over it in the courts, which lasted for upwards of ten years, with their strain and worry, caused, as many believed, the premature death of Lord Selkirk at forty-nine in 1820. The directors of the Hudson's Bay Company had granted Selkirk an area of 116,000 square miles, comprising parts of what are now Manitoba, North Dakota and Minnesota, and regarded as about the most fertile district in the whole North American continent. By the deed of January 12, 1811, Selkirk became the owner in fee simple of a tract five times the size of his native Scotland. This brought Selkirk and the Hudson's Bay Company in deadly conflict with the Northwest Fur Company, whose directors were more interested in their fat dividends than in philanthropy. They gave Lord Selkirk no peace in the courts until, on the verge of financial ruin, his health broke. In 1821, the year after Lord Selkirk's death, the rival companies combined and later made a financial settlement with the Selkirk heirs. In 1869 the purchase of the territorial rights of the consolidated Company by the Dominion Government led to Riel's rebellion, which was dispersed by British regulars under Colonel (later Lord) Wolsely. Lord Selkirk seems to have lived about fifty years ahead of his time. Sir Walter Scott is reported to have said of him: "I never knew in my life a man of

more generous and disinterested disposition." A town and county in Manitoba bear his name.<sup>1</sup>

Why did Audubon refer to Lord Selkirk in 1828, and why was he curious to know if "Audubon of La Rochelle remembered Selkirk's Settlement?" For no better reason, apparently, than why he should wish to know if this same Audubon of La Rochelle, whom we have supposed all along was the naturalist's uncle, remembered his own brother, Jean, with whom we are told that he had quarreled.

Lord Selkirk's active colonial work lasted seventeen years, 1803 to 1820, during which time Audubon,—with the exception of about a year, 1805-06, when he was at Couëron,—was in the United States, mostly engaged in various business enterprises. On July 26, 1817, Audubon, as already noticed, executed a power of attorney in favor of his brother-in-law, Gabriel Loyen du Puigaudeau, a little more than a year after their father had drawn up his last will and but little over six months before his death. This will was at once contested in the courts of Nantes, on the ground that Lieutenant Audubon's natural children, J. J. F. Audubon and Rose du Puigaudeau, could not inherit property under French law. When this litigation became known, Audubon seemingly broke off relations with his father's family at Couëron, and in June, 1820, after the lawsuit had been settled by compromise, we find his brother-in-law writing him an appealing letter, saying that no word had come from him in two years, and that Madam Audubon "does not cease to speak of you." Audubon did not ignore this appeal, and as recorded in his journal, on January 10, 1821, at New Orleans, he wrote letters to his brother-in-law and to his foster mother at Couëron, a long neglected duty as he acknowledged.

Audubon, in his European journal, spoke of "my mother, the only one I can truly remember; and no one ever had a better, nor a more loving one. Let no one speak of her as my stepmother. I was ever to her a son of her own flesh and blood, and she was to me a true mother." If such apparently spontaneous statements are taken to mean what they say, they would be fatal to the theory that Audubon was the son of Louis XVI and Marie Antoinette. In spite of such protestations, on the other hand, on August 6, 1826, Audubon writes in his journal, of plans for going to "Nantes to see my venerable stepmother," who had died on October 18, 1821; again in 1828, he spoke of this estimable woman as if she were then alive, although she had been dead seven years! This seems to show pretty conclusively that Audubon had for a long time been out of touch with his father's family, although one must think that he had been notified of his stepmother's death since he was a beneficiary under her will.

<sup>1</sup> For the facts concerning Lord Selkirk's life I am mainly indebted to 'Lord Selkirk's Work in Canada,' Oxford Historical and Literary Studies, vol. 7. By Chester Martin, Oxford, 1916.

## VI

For some time I have been in correspondence with Stéphane Antoine Fougère, at one time mayor, and now a judge in the civil courts of Les Cayes, a city having at the present time a population of twenty thousand souls, and one of the most important seaports of the Republic of Haiti. By perpetuation of a cartographical blunder it is still sometimes designated "Aux Cayes," which means literally "at the keys" or Cays.

In a recent letter Dr. D. F. Rafferty says: "At the beginning of the World War I was ordered to Haiti, and stationed at Les Cayes, in charge of a French hospital. A friend sent me your book on Audubon . . . , and after reading it . . . I loaned the book to Mr. Uriah Cardozo, who returned it to me with the comment that the author had not mentioned the fact that Audubon was actually born aboard a schooner in the roadstead of Les Cayes. Apparently the story had some foundation in fact as it was common knowledge among the intelligentsia of Les Cayes."

The following information relating to Mademoiselle Rabin, Audubon's mother, to her parents, in whom were united the Rabin and Fougère families, and to Belony Fougère, the reputed brother of Jean Jacques Fougère Audubon, I give on the authority of Judge Fougère, who considers himself a great-grand-nephew of Audubon, in direct descent from Belony Fougère. His knowledge of his family history comes from his grandfather, Oxilus Fougère, who died at Les Cayes in 1908, at the age of eighty-five, and who had often spoken of his famous uncle, who lived in the United States, referring of course to J. J. F. Audubon. If the naturalist were correct in speaking of having had two (or three) older brothers, he was mistaken in thinking that all of them had been "killed in the wars," for Belony survived and his descendants are living in Les Cayes today.

Audubon's mother, according to this account, came from two well-known, land-owning families, the Rabins and the Fougères, who held estates respectively in the northern and southern parts of what is now the Haitian Republic. These tracts still bear these family names, in accord with the French custom of naming sections of the public domain after the principal land-owners, and are so marked on the maps today. Judge Fougère, who has kindly investigated this matter for me, found that in S. Rouzier's 'Geographical and Administrative Guide Book of Haiti,' the Rabin division in the north is situated in the fourth rural section of the Commune of Port-de-Paix, and the Fougère section in the district of Miragoâne in the southern part of the country. Her father, M. Rabin, is said to have objected so strenuously to his daughter's consorting with Captain Jean Audubon, a married man, that she insisted on having her children by him bear the patronym, not of that irate parent, but of her mother, who was presumably

more complacent. Perhaps Audubon's early dislike of the Rabin name may be traced to the opposition expressed by his mother, but this is purely speculative.

Mr. Arthur, in his careful biography, has reversed the names of the parents of Audubon's mother, giving Fougère as the father's name. Since both of us have derived our information from the same source, I have recently appealed to Judge Fougère to settle this question if possible, and he has written me under date of May 22, 1937, as follows: "If I have written to Mr. Arthur that Mlle. Rabin was probably Rabin by her mother, and Fougère by her father, it may have been due to a *lapsus calami* . . . nevertheless this false belief has been practiced by the Fougère family for a good long time. I have been lately positively convinced of the fact that Mlle. Rabin was Fougère by her mother, through explanations received from a near relative. As to whether the Mademoiselle was Fougère by her mother or her father is, in my opinion, a matter of no real importance. What is of the utmost consequence to know is that the Fougère of Audubon's baptismal name came from one of the grandparents on his mother's side."

Belony Fougère, Audubon's older brother and Judge Fougère's great-grandfather, according to the family records which I am now following, married Francine d'Obcent (or d'Opsant) Dumont, who was the owner of the large rural section of 'Dumont' in the district of Les Cayes. He worked as a planter, at one time taught school, and also set up as a shoemaker. Belony had two sons, Ozilus and Tibère, and four daughters, Bélophine, Telcila, Dulcinette and Elmirène. Louis Joseph Simon, a son of Telcila, and now living at Les Cayes, was at one time General Haitien Consul at New York. Belony spent his early life at Les Cayes, but later lived at Jérémie where he died.

Oxilus Fougère, nephew of Audubon, and grandfather of Judge Fougère, to continue this account, was a physician and also had a pharmacy at Les Cayes. He had three sons, Antoine, father of Judge Fougère, Fenimore and Marc, and a daughter, Marie. Antoine was a pharmacist of the first class at the University of Paris, and a former house surgeon in that city, with the degree of licentiate in medicine. Fenimore was a physician and assistant surgeon in the French army in 1870. Both Antoine and Fenimore were in Paris seventeen years. Some have thought that the name of La Forêt, or La Forest, which Audubon adopted and used for a time in his early life was a fanciful one, but according to Judge Fougère, as noticed by Mr. Arthur, Mlle. d'Obcent-Dumont, who became the wife of Belony Fougère, was a descendant of a family bearing that name, and having plantations at Jérémie. The Laforests living there today all have colored blood.

## VII

If Audubon had been the son of Louis XVI and Marie Antoinette, is it possible to believe that he would have been sent to Paris, presumably in 1802, when the world had been "on fire with his pursuit," to study under Jacques Louis David, famous artist and Conventional regicide, who had voted to send his father to the guillotine, who had visited him when a prisoner in the Tower, presumably with the intention of painting or drawing his portrait, and who had actually sketched the pathetic figure of his own brave mother when on her way to the scaffold? This reference to Marie Antoinette suggests another critical scene in the life of this young queen, who had grown old while still in her thirties. On that desolate winter's morning of January 21, 1793, in Paris, in an upper room of the Templars' Tower, were gathered a stricken mother, the Princess Elizabeth, familiarly known as "aunt Babet," the two royal children, Marie Thérèse Charlotte, and Monsieur Charles, the Dauphin of France, in the presence only of their two watchdogs, the commissioners who were daily detailed from the Convention, and their faithful pantry boy, Turgu. In a set of significant questions which this same youth, in later years when grown to manhood, had sent to the spurious pretender, "Charles de Navarre," in 1817, was this: "What took place on January 21, when the cannon were heard in that upper room? What did your aunt say at that instant, and what unusual thing was done for you?" No answer to these questions was ever received, and it is safe to say that not one of the numerous claimants to having been that little boy,—no more than John James Audubon, who at that very time, according to his own written statements, was living at Nantes, under the roof of his father and devoted stepmother,—could have met this test with any better success. Audubon was not Louis Charles!

As far as anyone now knows, Turgu never answered his own query, but we may surmise that the mother and aunt embraced the child, and said perhaps the traditional thing: "Louis Charles, the King, your father, is dead: long live the new king, his son!" Very likely they tried to explain to him the new position in which he and they were now placed. The Dauphin was then not quite eight years old, having been born on Easter Day, March 27, 1785, and Audubon was about a month younger.

I have stated a number of facts and circumstances which weigh strongly against the idea that Jean Jacques Fougère Audubon was Louis Charles, the Dauphin, and later, by right of inheritance, Louis XVII, King of France; but there is another consideration, that of physical marks upon the body, that is even more important, and ought definitely to settle the question.

Those closest to the Dauphin knew of certain marks upon his body which taken together could identify him with absolute certainty. These were (1) vaccination marks on both arms, (2) a scar over the left eye, and another

on the right side of the nose, and (3) a deformed right ear, which had its lower lobe excessively enlarged. The first two were unimportant because they could be easily produced. Eleazar Williams or any other spurious pretender might, and sometimes did, point to such scars in the right places, but the deformed ear was a physical character which could not be imitated. There was then no plastic surgery in France of that day which could either remove or produce such a blemish without trace. This defect was never generally known, and probably actually known to but very few, if any, outside the royal family; and no wonder since the boy Dauphin, as seen in life and in his portraits, had always appeared with long locks, banged and hanging down over his ears, which they completely concealed; and no doubt his fond parents were quite willing that his tresses should hide such an abnormality. It was a bodily mark that tripped many a brazen pretender in the eyes of the knowing.

Did anyone ever notice that John James Audubon had a deformed right ear? Not so far as is known, and his numerous portraits give no suggestion of it. If Audubon's right ear was normal, as he and other artists represented it to be, he was not Louis XVII. Had Audubon possessed such a deformity would he have consented to the sacrifice of his 'ambrosial' locks in Edinburgh, on March 19, 1827?

## VIII

There is probably no parallel in history to the Dauphin 'racket,' which began in France shortly after the reputed death of Louis Charles, lasted for the better part of a century, and the reverberations of it are felt even to this day. The causes which led to such an extraordinary succession of events do not seem to have ever been duplicated in either ancient or modern times.

Within five years after the death of the Dauphin, as recorded in the Temple's archives, seven boys, all claiming to have been Louis XVII, had already come to the attention of the French police. Soon they kept bobbing up overnight, here, there, and everywhere, and sometimes two were circulating in the country at the same time. Three who made such fraudulent claims, were living at one time or another in the United States or Canada. One of these, Eleazar Williams, I shall speak of later. The Dauphin's sister once remarked, when the number of those claiming to be her lost brother, had reached twenty-seven, that she believed every one of them to be false. Fifty years after the reported death of Louis Charles, the number of those claiming to be, or who believed, or who imagined themselves to be, that prince, had risen to forty, and some have estimated that the roll of dishonest claimants has by now touched the seventieth mark! They were an assorted collection of near lunatics, unstable persons with insistent

ideas such as delusions of grandeur or plain monomaniacs, mendacious liars, clever forgers, general swindlers or adventurers, and pious hypocrites. What did they expect to gain by such fraudulent claims? Probably not a diadem or kingly crown in most cases, but money and gifts of various sorts from the credulous, a share perhaps of the large private fortune of the sister of the Dauphin, and above all public acclaim and notoriety. The shrewdest forgers or the most consistent and accomplished liars did often obtain some of these things, such as jewels, coin of the realm, and a chance to live for a time at least in luxury. Several wrote fictitious memoirs, and many figured in the law courts, when they often drew fines and prison sentences. Their claims were usually thrown out of court, but if they were banished from the country they were certain to turn up again in the same rôle somewhere else.

Probably no boy in the world's history, whose life, or that part of it about which anything is definitely known, extended to only ten years, two months and two days, to follow the Tower record again, has had so many biographers, so many impersonators, or who has been pronounced dead and buried so many times, and in so many different places. Under such circumstances it is not surprising that the bibliography<sup>1</sup> of this unfortunate prince has extended to extraordinary proportions. Over a hundred years after the reported death of the Dauphin a monthly publication, '*Revue Historique de la Question Louis XVII*,' was started in Paris, and its editor began his address to his prospective readers with a quotation from Renan: "I fear," said Renan, "that the work of the twentieth century will but consist of retrieving from the waste basket a multitude of excellent ideas which the nineteenth century had heedlessly thrown away. The survival of Louis XVII, after leaving the prison of the Temple, is one of these ideas." This journal lasted until 1911 when six volumes had been completed. Moreover, this was published to continue the work of another periodical, *Bulletin de la 'Société d'Etudes sur la Question Louis XVII*,' which had a life of twenty-three years.

There was a shrewd adventurer, who suddenly appeared in 1830, coming apparently from nowhere, and passing under the German name of Karl Wilhelm Naundorff, in recent times identified, though not with complete certainty, as Carl Benjamin Werg. After a long and checkered career, he was thrown out of France, and went to England, where he invented a bomb that was operated by clockwork. Failing to interest the English in his invention, he started for Holland in 1845 with a passport bearing the name of "Charles Louis de Bourbon." Being detained at Rotterdam, the question of admitting him soon became one of international diplomacy

<sup>1</sup> William W. Wight, in his '*Louis XVII: A Bibliography*,' Boston, 1915, lists 478 titles, and these were strictly limited to material found in his own library.

between France and Holland. The Dutch appear to have wanted his bomb, and having little liking for Charles X, the French king, the matter dragged over five months and ended in a compromise. The French were willing to have the name "Charles Louis" appear in the document,—the Dauphin's name being "Louis Charles,"—and for all they cared the bomb could be called "the Bourbon bomb," but they would not go a step farther. This was held, but on insufficient grounds, as a tacit admission that the Naundorff family was entitled to use the Bourbon name. The agreement was signed on June 20, 1845, and Naundorff, who had gone to Delft, was dead of typhoid fever less than two months later.

In 1851, the Naundorff family tried to get from the French Government an acknowledgment of their claim to the use of the Bourbon name, but without success, and they appealed against this verdict in 1874, but lost again. Finally in 1911, the Naundorff descendants made a third attempt at having their claim of being scions of Louis XVI acknowledged in France, but were again denied, and there the matter now stands. Naundorff had neither the physiognomy nor the physical marks of the Dauphin, but many believed that he was rather better than the average run of pretenders. Minnigerode,<sup>1</sup> whom I have followed in this statement of the Naundorff case, is undoubtedly right in saying that the admission, wrung from France by the Dutch in 1845, was one which no French court for a moment would have allowed. Nevertheless, Naundorff was buried with honors of royalty at Delft, and his monument there bears this inscription: "Louis XVII, roi de France et de Navarre (Charles Louis duc de Normandie)."

## IX

A much more difficult subject to understand than the Hervagaults, the Richemonts or the Naundorffs, is the psychology of an American pretender to royalty, Eleazar Williams, one-time missionary to the Indians. It is a pity that Gamaliel Bradford never psychoanalyzed him. He had no criminal record, but was a teacher among the Indians for many years, and Bishop Hobart, of New York, ordained him to the ministry of the Protestant Episcopal Church, and baptised his Indian wife, giving her the name of Mary Hobart. Williams translated the Book of Common Prayer and numerous hymns into the Iroquois language, and at Green Bay, Wisconsin, started a school for half-breed Indian children. This was maintained until 1823, when he married one of his pupils. In 1839, Williams is said to have confided to a Buffalo editor that he was the real Dauphin of France, and ten years later an article, supposed to have been written or inspired by Williams himself, appeared in the 'United States Democratic Review' in

<sup>1</sup> See Meade Minnigerode: 'The Son of Marie Antoinette: the Mystery of the Temple Tower,' New York, 1934.

which his definite claim to royalty was made public. Meantime Williams repeated his story to anyone who would listen, but the widespread notoriety, after which he had evidently been striving, came with the publication in 'Putnam's Monthly Magazine' for February, 1853, of an article entitled "Have we a Bourbon among us?" by the Rev. John H. Hanson. Hanson corresponded with Williams, visited him, travelled with him, and became such an enthusiastic supporter of his cause that he wrote his biography, a volume of nearly five hundred pages, published in 1854. Hanson was an idealist, without a particle of critical judgment, and believing in the unimpeachable integrity of his hero, he accepted without question all of his yarns however amazing or impossible. I can relate but one of these which came out in a conversation with Hanson, who said in effect: "Before you left the Temple, at the age of ten you must have stored up in your mind many vivid memory pictures of extraordinary events, some of which you will be able to recall. Now I wish you would describe some of them." "A most remarkable fact," replied the self-styled Louis XVII, "is that up to the age of thirteen or fourteen my mind is like a blank page; nothing is written on it. Consciousness seems to have been imperfect or entirely lacking, and at that early period I was practically an idiot. Then, this strange thing happened: one summer's day, when I was bathing with a number of Indian boys, my friends, in the waters of Lake George, in my foolish way I climbed a high rock over the water and dived. The shock rendered me unconscious, but my boy friends dragged me out, and when I was gradually restored to consciousness, I was a changed person. My mind was given back to me, and the events which had happened in my earlier years in Paris were recalled. Pictures of soldiers and great personages were there, and there was a hard, cruel face, which I seemed to recognize with a start, as I suddenly came upon it when on a steamboat, or upon entering a train. I think what startles me must be the resemblance to my evil guardian of an early day, Simon, the cobbler!" Intelligent people probably knew as well then as they know now that a sharp blow upon the head is not conducive to an improvement in mentality. The Rev. Mr. Hanson should have remembered the Old Testament proverb: "Though thou shouldest bray a fool in a mortar among wheat with a pestle, yet will not his foolishness depart from him."

Williams told Hanson that the Prince de Joinville, son of Louis Philippe, came to Green Bay and tried to get him to sign an abdication of his rights to the French throne. When this was denounced in France as a pure fabrication, Williams said to Hanson: "I do not trouble myself much about the matter. . . . My story is on the wings of heaven, and will work its way without me. . . . God in His providence must have some mysterious ends to answer, or He would never have brought me so low from

such a height. . . . I do not want a crown. I am convinced of my regal descent; so are my family. The idea of royalty is in our minds, and we will not relinquish it. You have been talking to a king to-night." They were then on a steamboat, approaching Burlington, Vermont.

In concluding his article on "The Bourbon Question," a sequel to the one to which I have referred, Hanson said: "To those who have charitably attributed to me the origination of a moon hoax<sup>1</sup> to sell a magazine, or the credulity of adopting the baseless tale of a monomaniac I reply . . . that I am content to leave the case to speak for itself, quite satisfied with the approbation of those, neither few, nor stupid, nor credulous, who entertain with me the strongest conviction of the high probability that beneath the romance of incidence there is here the rocky substratum of indestructible fact."

Eleazar Williams said that his story would work its way without him. It has, but has taken a different course from what he would have chosen, especially since the historians of the University of Wisconsin made it their business to investigate his life history. It has been definitely established that Eleazar Williams was a half-breed Indian, son of Thomas Williams and Mary Ann Kenewatsenri. Thomas was a grandson of Eunice Williams, who was a daughter of John Williams, minister at Deerfield, Massachusetts. She was captured in 1784 in a French and Indian raid, was married to an Indian chief of Caughnawaga, and her descendents all bore the Williams name. In 1824 Eleazar gave Sault St. Louis (Caughnawaga, Canada), as his birthplace, but he publicly maintained the fiction of being Louis XVII up to his death in 1858.

Eleazar Williams stands in a class by himself among the better-known pretenders to royalty in relation to Louis Charles. Why did this minister and missionary worker choose to lead a life of duplicity? His dishonesty brought him no monetary rewards. His greatest weakness seems to have been an inordinate vanity. His bold claims and those of his credulous friends, who did not know him any too well, made him a marked man and wherever he went interest in him was aroused. If he preached in a country church, that was an event to be remembered. In a recently published work on 'Old Historic Churches of America' there is pictured a church at Longmeadow, Massachusetts, "with which," it was stated "is associated the romantic story of Eleazar Williams, believed by many to have been Louis XVII, of France."

## X

What shall be said of the conjectures of Mrs. Tyler on this crude Williams hoax? "There is a persistent rumor in Canada," says Mrs. Tyler, "that

<sup>1</sup> Referring to the story in 'The (New York) Sun,' of August 25, 1835, sometimes called the greatest scientific fraud ever perpetrated, purporting to have been written by Sir John Herschel, but now believed to be the work of a clever reporter, Richard Adams Locke.

the Dauphin lived there. When a legend of this kind lives through a century, it usually has some basis in fact, as is now seen [the basis being that Audubon was Louis XVII, and as such had lived in Canada]. And this may even account for the story of the 'mythical Williams boy,' who was missionary to the Indians, for Audubon's religious life was deeply spiritual, and he may have used his stay in Canada to this end; and the Williams boy's mother, Mrs. Williams, is reputed to be the indomitable and indefatigable Lady Atkyns, who gave Marie Antoinette her pledge that she would never stop till she had saved her son, Louis 17th. It may be that Lady Atkyns's pledge was thus fulfilled."

What a strange denouement! Audubon, at the age of eleven, giving spiritual comfort to North American Indians, whom he had never seen, in 'Selkirk's Settlements,' which did not then exist, and in a country which he had never visited! What, I wonder, would Lady Atkyns have thought, Walpole born, whose husband had been a Norfolk baronet, after all her money had been thrown to the winds in a vain, if worthy, cause, of being the reputed mother of a half-breed American Indian, and a pious imposter at that? Would not the ardent biographer of that "Williams boy," who protested that he was not starting a moon hoax, be equally surprised to know how much moonshine there was in his whole story?

Audubon's life was romantic enough. He does not need any false halo of royalty. He can stand on his own feet.

AFTERWORD.—When we consider the fierce partisanship engendered during the Revolution, and the wide breach between what contemporaries spoke or wrote, and what they really thought or believed, the testimony of eye-witnesses to events in or about the Temple must be considered most untrustworthy. Moreover, the failure after one hundred and forty years of hot debate to throw any clear light on the ultimate fate of the Dauphin tends more and more to convince us that he was "lost" only in the sense that he had died. If this be the hard truth, what could be more vain than refuting the claims of pretenders or their descendants?

*Cleveland Heights*  
*Ohio*

NOTES ON AVIAN COCCIDIOSIS<sup>1</sup>

BY DONALD C. BOUGHTON

## Plate 31

## INTRODUCTION

To suggest to the ornithologist that his birds are hosts to a variety of interesting animal forms which have elaborated marvelously adapted modes of life within the avian body, is perhaps, to press the point too far. The hint, however, that some of these animals, as parasites, are the causes of severe diseases in birds should arouse his concern. The *Coccidia* comprise one group of these parasites. *Coccidia* are one-celled animals which grow and multiply in the epithelial cells of various higher animals, often in the lining of the intestine, causing destruction of host tissues. An end-product of the multiplication cycle within the host is the microscopic spore (oocyst) which passes from the host body in the fecal discharge. In most cases the coccidian spore requires a developmental period (sporulation) in a moist place outside the host, in order to produce within itself the minute forms (sporozoites) which are capable of beginning again the parasitic multiplication within a new host. Should a susceptible bird ingest a few 'ripe' spores of an appropriate avian coccidian, the latter would become established in the bird; the bird would then become 'infected.' The resulting disease is called coccidiosis.

Since coccidiosis is a serious and widespread disease of birds, it may prove of interest to ornithologists to present briefly a few facts regarding: (1) the two types of avian *Coccidia*; (2) coccidiosis in small birds; (3) examination and sources of bird hosts; and (4) the distribution of *Coccidia* among bird groups.

## TWO TYPES OF AVIAN COCCIDIA

The *Coccidia* of birds are divided into two genera, *Isospora* and *Eimeria*, which are as distinguishable to the protozoologist as are *Turdus* and *Zonotrichia* to the ornithologist. Morphological differences are most apparent in the mature spores. When first discharged from the bird, the spores contain rounded masses of protoplasm and those of *Isospora* and *Eimeria* look very much alike (Pl. 31, figs. 1, 3). However, in the course of several hours or a few days, depending upon the coccidian species involved, the cystic content undergoes characteristic changes. To facilitate this development, fecal material containing spores may be cultured in 2 per cent potassium-bichromate solution. The spore (oocyst) of *Isospora* forms two secondary cysts (sporocysts) shown in Figure 2 (Plate 31). Each secondary

<sup>1</sup> From the Department of Animal and Plant Pathology, Rockefeller Institute for Medical Research, Princeton, New Jersey.

cyst actually contains four minute, infective forms (sporozoites), but these are not readily made out in detail. The spore of *Eimeria* forms four secondary cysts as shown in Figure 4. Each of these contains only two infective forms (not readily made out in detail). For detailed drawings of various coccidian spores the reader is referred to Becker (1934). The microphotographs presented here faithfully reproduce the appearance of the spores as seen under the microscope.

Various species of *Eimeria* are responsible for the coccidiosis in quail, pigeons, and chickens. For a review of coccidiosis in these birds the reader is referred to Becker (1934) and for a detailed study of poultry coccidiosis to Tyzzer (1929) and Tyzzer *et al.* (1932). No authentic case of coccidiosis in poultry due to *Isospora* has been reported. Likewise, with a possible exception to be noted later, *Eimeria* is not found in perching birds. In 1910, Hadley condemned the House Sparrow and other small birds as carriers of the poultry disease. Actually there is no evidence to support this accusation, as has been shown by several workers (Smith and Smillie; Johnson; Boughton, 1929). To a limited extent, sparrows may carry Eimerian spores mechanically, but they certainly are not natural reservoirs for poultry coccidiosis.

Coccidia of the genus *Isospora* are found in many birds, especially passerines. A recent survey (Boughton, 1938) has shown that 173 species and subspecies of birds have been reported as hosts of *Isospora*. One hundred and forty-seven of these belong to the order Passeriformes, while the remaining twenty-six are scattered through eight other orders. When a sufficient number of individuals is examined, the incidence of infection is found to be relatively high in most of these bird species. For the English Sparrow it is practically 100 per cent (Boughton, 1937). In the summer of 1933 the writer obtained the following records for *Isospora* from birds banded at the Baldwin Bird Research Laboratory: Catbird (*Dumetella carolinensis*), 8 out of 11; Eastern House Wren (*Troglodytes aedon aedon*), 26 out of 45; Eastern Song Sparrow (*Melospiza melodia melodia*), 82 out of 91; Eastern Field Sparrow (*Spizella pusilla pusilla*), 10 out of 11; Eastern Chipping Sparrow (*Spizella passerina passerina*), 13 out of 16. The incidence is high also in troupials and other cagebirds. Captive Birds of Paradise are commonly infected with an *Isospora* which has recently been described as a new species (Boughton, 1937).

#### COCCIDIOSIS IN SMALL BIRDS

Typical coccidiosis in small birds caused by coccidia belonging to the genus *Isospora* has been reported by various European workers (Condorelli and Fiore, Labbé, Laveran, Sjöbring, Wasielewski). The disease is similar in many respects to coccidiosis in poultry. An infection may eventually

lead to destruction of the intestinal epithelium with subsequent loss of appetite, emaciation, droopiness, diarrhea, and finally death due to acute enteritis. Sjöbring reports finding adult birds in nature heavily infected. When approached, such birds could make only feeble attempts to fly away, and when captured and caged, remained quiet, squatting on the abdomen, and would neither eat nor drink. Death usually followed shortly. Nestlings were found with severe infections; sometimes they would be pushed from the nests and left to die. Wasielewski reports an epidemic which caused severe losses in his stock of experimental canaries.

Observations of the present writer on the disease in House Sparrows may be summarized as follows. Nestlings and juveniles in Nature are heavily infected with *Coccidia*. Although the daily discharge of enormous numbers of spores must certainly destroy large numbers of intestinal cells, many young birds survive their initial infections without apparent discomfort. Perhaps some do succumb to coccidiosis. Unless brought to our attention in epidemic form coccidiosis might go unnoticed as a "natural" cause of death for birds in Nature. There is certainly sufficient evidence, however, indicating that it can be a fatal disease under certain conditions. For example, in juvenile and adult sparrows which normally maintain chronic infections, apparently indefinitely, fatal infections can readily be induced by feeding heavy suspensions of infective spores. On the fifth or sixth day after inoculation, the bird exhibits characteristic symptoms. The feathers are fluffed out; the head is kept under the wing much of the time. There is weakness of the legs resulting in a squatting position, loss of appetite, and a drop in body temperature. When caged with others, an inoculated bird is irritable and pecks viciously at its fellows when disturbed. Death usually occurs about the seventh day after inoculation. An English Sparrow six days after inoculation is shown in Figure 5 (Plate 31). This bird died two days later. Under ordinary conditions in Nature, birds are not likely to ingest at one time such large numbers of infective spores as are given in these fatal, experimental inoculations. However, further investigation is required to determine to what extent natural conditions may permit the development of fatal infections. Passerine coccidiosis differs from poultry coccidiosis (and avian malaria also) in that relatively little resistance to subsequent infection is built up during the first infection of the young bird.

Figure 6 (Plate 31) shows a typical section of the upper intestine of a naturally infected sparrow killed late in the summer of its first year. The *Coccidia* are visible as dark, rounded bodies within the epithelial cells; there is no evidence of tissue response. Most of the parasites shown in Figure 6 are macrogametocytes ('female forms') at the characteristic stage for 3 p. m., at which time the host was killed. Had their normal growth

and development been permitted to continue, these forms would have been discharged in the fecal material about 6 p. m. as spores like those shown in Figure 1.

Chronic infections are common in domestic canaries, and as such are potential sources of trouble. In small pet shops in several cities of the United States and in several research laboratories, the writer has found from 15 to 50 per cent infection among canaries. In 1930, through the cooperation of the R. T. French Company, the writer was able to examine fecal samples of a few privately owned canaries. Ten per cent showed oocysts of *Isospora*. The birds were individual pets and had received routine care in the home for a year or more prior to the examination. Unfortunately, the phenomenon of daily periodicity in the appearance of oocysts was not known when this survey was made, and hence the samples were not taken at the most appropriate time of day. However, it is evident that canaries can maintain chronic infections for considerable periods under average care in private homes. The most likely explanation of this condition is that birds reinfect themselves from time to time with small numbers of infective spores, in spite of the daily cleaning of cage floor and perches. The spores of *Isospora* from birds are probably infective ten to twelve hours after being discharged from the host body. One should consider also the ability of the *Coccidia* to maintain themselves by continuous multiplication within the host tissues. In chronic, low-grade infections it appears that a balance is maintained between host and parasite, such that the host can go through life without apparent discomfort. Under routine caging conditions, captive birds may never have access to sufficient numbers of infective spores to cause trouble. It is always possible, however, that the balance may be upset by some extraneous factor. Certainly the chronic cases are carriers and constitute a reservoir for the propagation of the parasites.

There is no treatment known for coccidiosis in small birds. Preventive measures against infection involve cleanliness in the care of birds and the removal of obviously infected individuals, the point being to reduce repeated ingestion of infective spores. Spores are usually passed in large numbers between 3 p. m. and 9 p. m. (Boughton, 1933). They can readily develop, on the cage floor or in the water dish, so as to be infective, presumably, the next morning. It may sometimes be necessary to adjust the cleaning schedule in order to eliminate each daily batch of spores. Periodic microscopic examinations are helpful for estimating the degree of infection in a group of birds and for singling out offensive carriers.

#### EXAMINATION AND SOURCES OF BIRD HOSTS

The presence of *Coccidia* in birds can usually be determined by microscopic examination of the feces of living specimens and of the intestinal

contents or mucosal scrapings of killed specimens. Ordinary smear preparations are satisfactory for demonstrating the spores unless the infection is very light, in which case it may be necessary to resort to concentration by centrifugation. Often, however, one can take advantage of the daily periodicity exhibited by coccidial spores, which results in a natural concentration for certain hours of the day. As suggested above, the spores of *Isospora* in many passerine infections are to be found only in fecal material passed during the afternoon and early evening, with a peak at approximately 6 p. m. that is characteristic. In pigeons, which are parasitized by *Eimeria*, 80 per cent of the daily output of spores is to be found in the fecal material passed between 9 a. m. and 3 p. m. (Boughton, 1934). Examination of living birds has the following advantages: the birds need not be sacrificed; the spores will sporulate naturally when cultured, whereas they are often injured by an abnormal stay within a dead host; often the observer can make sure, by controlling the feeding of the bird, that the spores seen are derived from the host itself and not from material recently ingested. Killed specimens permit macroscopic examination of organs for gross lesions; microscopic examination of mucosal scrapings for the tissue stages of the parasite; and, if the bird is freshly killed, fixation of tissues for histological studies. In all examinations one should guard against the possibility of confusing multiplication stages of different parasites and the misinterpretation of the presence of a few extraneous spores. This last point is emphasized because mistakes have been made by some investigators who have reported the presence of *Coccidia* in certain hosts which in reality had only accidentally ingested spores belonging to another host.

Museums and zoological gardens are invaluable sources of bird parasites. Unfortunately, as far as *Coccidia* are concerned, these sources have been almost entirely neglected in the past. Expeditions sent out to collect birds actually destroy large numbers of associated Protozoa. It is to be hoped that the parasitologist will find it possible in the future to work in cooperation with public and private institutions in the study of *Coccidia* of birds. The present writer has been most fortunate in securing the aid of many ornithologists and institutions in his various studies. It is a pleasure here to acknowledge the cooperation of the following: Mr. Charles Stahnke of the Milwaukee Zoological Garden; Mr. S. Prentiss Baldwin and his staff of the Baldwin Bird Research Laboratory, Gates Mills, Ohio; Dr. Dora P. Henry of the University of Washington; the R. T. French Company, Rochester, N. Y.; Mr. Lee Crandall of the New York Zoological Gardens; Louis Ruhe, Inc., New York City; and the proprietors of various pet shops in several different cities.

## DISTRIBUTION OF COCCIDIA AMONG BIRDS

The wholesale parasitism of a specialized group of vertebrates (Aves) by highly adapted Protozoa (Coccidia) presents an opportunity for studying a variety of problems of broad biological significance.

For example, there is the problem of parallelism in evolution of host and parasite. Sometime in their past histories the two genera *Eimeria* and *Isospora* have parted company. The accompanying list shows that Coccidia have been reported from several orders of birds. In most cases only one genus is found in any one order, and, in general, *Eimeria* is the dominant form in the lower orders, and *Isospora* in the higher. (The positive orders of birds are listed in accordance with Wetmore's classification.) Observations are lacking for several groups and only meager negative records are available for others. Perhaps ornithologists having special opportunities to examine certain bird groups can add to our knowledge of the distribution of Coccidia in birds. In the writer's opinion certain observations require verification, as is suggested in relevant notes in the following list.

## Orders for which Coccidia have been reported

## PELECANIFORMES

*Eimeria*

*E. roscoviense* (Labbé, 1893) in *Phalacrocorax aristotelis* (= *P. cristatus* = *P. graculus*), cormorant, by Labbé (1896 and 1899). *E. urnula* Hoare, 1933, in *P. carbo lugubris*, cormorant.

## ANSERIFORMES

*Eimeria*

*E. truncata* (Railliet and Lucet, 1891) in kidney and *E. anseris* Kotlan, 1932, and possibly other species in intestine of *Anser anser*, goose. Vide Becker (1934).

## FALCONIFORMES

*Isospora*

*I. buteonis* Henry, 1932, in five species of hawks and *I. sp.*, Hegner and Chu, 1930, in kite and falconet. Vide Boughton (1938). Author's note: *Eumonospora tremula* Allen, 1933, amended to *Caryospora tremula* (Allen, 1933) Hoare, 1934, reported from *Cathartes aura septentrionalis*, Turkey Vulture, may very probably be a reptilian parasite.

## GALLIFORMES

*Eimeria*; *Isospora* (?)

Several species of *Eimeria* in chickens, quail, turkey, ptarmigan, pheasant, peacock. Vide Becker (1934). *I. lyrruri* Galli-Valerio, 1931, in *Lyrrurus tetrix tetrix* (L.), Black Grouse, and *Tetrao urogallus urogallus* L., Capercaillie. Vide Galli-Valerio (1931, 1932). Author's note: Because of the preponderance of records of *Eimeria* for this order and the meager details reported by Galli-Valerio, confirmation of the occurrence of *Isospora* in the two hosts listed is greatly to be desired.

## GRUIFORMES

*Eimeria*

*E. paludosa* (Leger and Hesse, 1922) in *Fulica atra atra* L., Gray-black Coot, and *Gallinula chloropus chloropus* (L.), Moor-hen. Author's note: This coccidian was originally placed in a new genus, *Jarrina*, but it properly belongs in *Eimeria*, as Hoare (1933) has shown.

## CHARADRIIFORMES

*Eimeria; Isospora*

*E. roscoviense* (Labbé, 1893) in nine species belonging to the families Charadriidae, plovers, etc., and Scolopacidae, sandpipers, etc. *Vide* Labbé (1896, 1899). *Isospora* in two species of Charadriidae. *Vide* Boughton (1938). Seven species of family Laridae, gulls and terns, reported negative by Labbé (1893a). Author's note: Further observations on birds of this order would be of considerable interest because both *Eimeria* and *Isospora* have been reported.

## COLUMBIFORMES

*Eimeria*

*E. labbeana* Pinto, 1928, and *E. columbarum* Nieschulz, 1935, in the domesticated pigeon. *Vide* Becker (1934) and Nieschulz (1935).

## CUCULIFORMES

*Isospora*

*Isospora* reported from one species in each of two families. *Vide* Boughton (1938).

## STRIGIFORMES

*Isospora*

*I. buteonis* Henry, 1932, in two species and *I. henryi* Yakimoff and Matikaschwili, 1932, in a third. *Vide* Boughton (1938).

## CORACIFORMES

*Isospora*

*Isospora* reported from four species representing three families. *Vide* Boughton (1938).

## PICIFORMES

*Isospora*

*Isospora* reported from six species representing two families. *Vide* Boughton (1938).

## PASSERIFORMES

*Isospora*

*Isospora* reported from 147 species and subspecies representing 27 families. *Vide* Boughton (1938). Author's note: Labbé (1893a) reports *Eimeria roscoviense* from the White Wagtail (*Motacilla alba*); this observation has not been verified by other workers although Labbé (1893) and also Laveran (1898) report *Isospora* in this host.

## ORDERS FOR WHICH COCCIDIA HAVE NOT BEEN REPORTED

Struthioniformes (1); Rheiformes; Casuariiformes (2); Apterygiformes; Tinamiformes; Sphenisciformes; Gaviiformes; Colymbiformes (3); Ciconiiformes; Psittaciformes (4); Caprimulgiformes; Micropodiformes (5); Coliiformes; and Trogoniformes.

Author's note: Limited negative records are available for the five orders designated by numbers. These are: (1) two Ostriches negative (author's observation); (2) one Cassowary, one Emu negative (author's observation); (3) negative record for *Podiceps cristatus cristatus* (L.) (= *Vanellus cristatus* Meyer and Wolff), Great Crested Grebe, by Labbé (1893a); (4) several parakeets, parrots and macaws negative (author's observation); and (5) one hummingbird negative (author's observation). There are no observations on the remaining orders.

There is also the problem of host-parasite specificity. Barnyard chickens are continually exposed to spores of *Isospora* dropped by sparrows and yet they do not become infected with species of that genus. Similar opportuni-

ties for quail to become infected with spores from passerine birds must exist in Nature. Specificity is marked for the genera of avian Coccidia. Perhaps it will prove to be so for species also. Species determination in Coccidia is more difficult, in the writer's opinion, than some describers of species have chosen to make it. Does each bird species have its own coccidian species or can one of the latter infect a variety of birds? These questions have more than academic interest. Answers to them would shed light on the problems dealing with the invasion of new territories by introduced bird species and the ability of several host species to occupy the same geographical range. A wealth of information regarding the evolution and distribution of the hosts is already available in the archives of the ornithologist. When the Coccidia of birds have been more thoroughly described and the results of cross-infection experiments are available for analysis, the parasitologist may be able to offer suggestions on relationships of avian species based on a knowledge of their parasites.

The widespread distribution of Coccidia among bird groups suggests the use of these parasites and hosts for studies on several other problems, which may be mentioned here briefly. Because Coccidia of wild birds represent natural parasites living in association with hosts which have not been subjected to such artificial alterations of physiology or environment as are often imposed upon domesticated animals, studies on coccidiosis in wild birds may disclose features of the disease not readily revealed, for example, in poultry work. Of interest to students of human and animal diseases are the problems of host resistance and immunity to sporozoan diseases, including malaria as well as coccidiosis. Experimental work on the genus *Isospora* in relation to its many avian hosts may prove of significance. Also, as pointed out above, there is sufficient evidence to condemn the genus *Isospora*, at least in certain cases, as a pathogenic parasite of small birds; as such it should be studied with an aim toward treatment and control.

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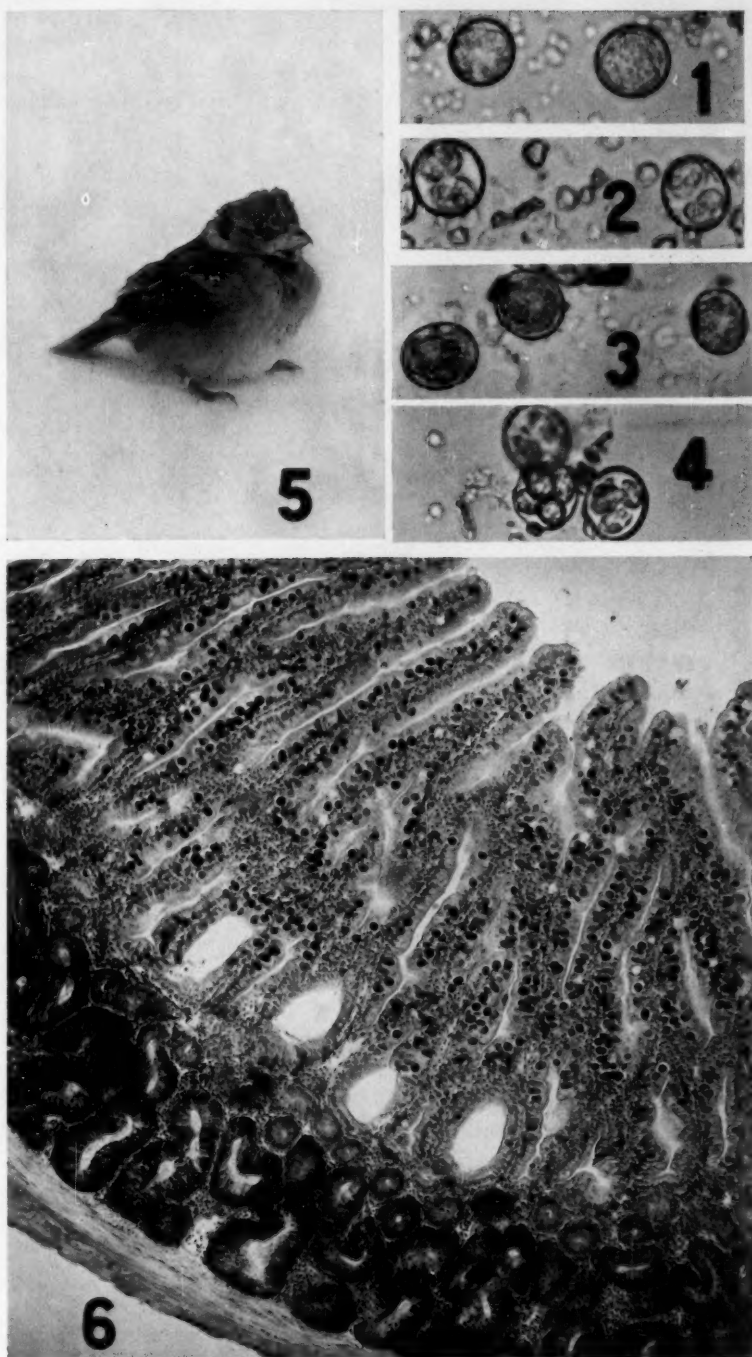
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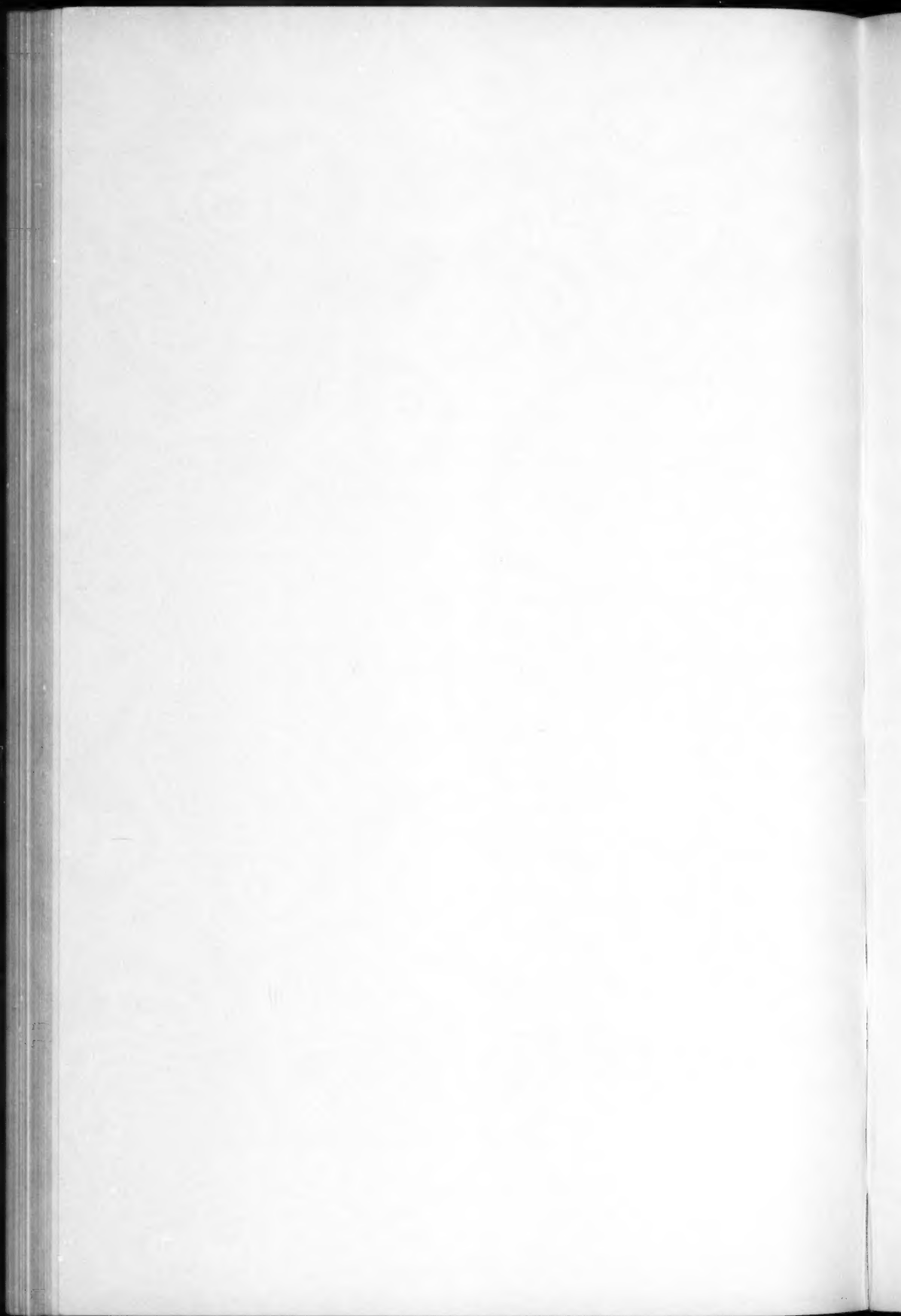
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AVIAN COCCIDIOSIS



EXPLANATION OF PLATE 31

Fig. 1.—Unsporulated spores (oocysts) of *Isospora* from the domestic canary.  $\times 475$ .

Fig. 2.—Sporulated spores (oocysts) of *Isospora* from the domestic canary.  $\times 475$ .

Fig. 3.—Unsporulated spores (oocysts) of *Eimeria* from the domestic pigeon.  $\times 475$ .

Fig. 4.—Sporulated spores (oocysts) of *Eimeria* from the domestic pigeon.  $\times 475$ .

Fig. 5.—English Sparrow with coccidiosis. Six days after inoculation with infective spores of *Isospora*.

Fig. 6.—Section of intestine of English Sparrow parasitized by *Coccidia* of genus *Isospora*.  $\times 80$ .

[Photographs by J. A. Carlile.]

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## A ROBIN WITH TWO SETS OF TAIL FEATHERS

BY ROBERT M. STABLER

*Plate 32 (upper figure)*

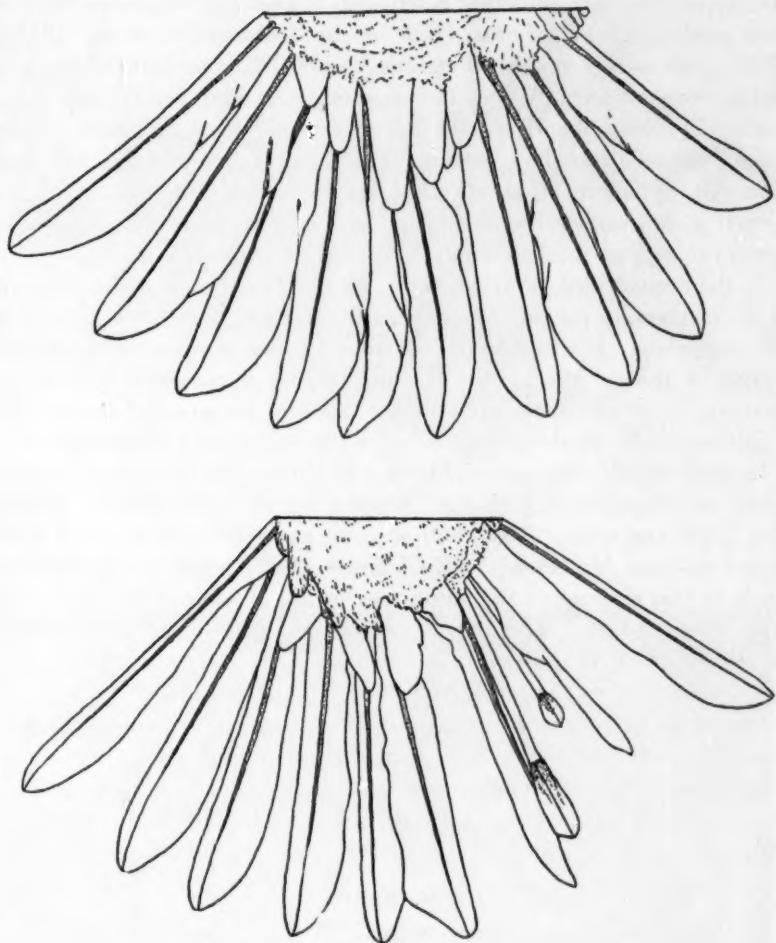
## INTRODUCTION

BIRDS with extra toes, extra legs and wings have frequently been described. Bond (1926) and Punnett and Pease (1929) asserted that there was a true genetic factor controlling the appearance of the supernumerary toes in extra-digited chicks. An extra leg was described by Adams (1930), Stoneman (1932) and Shaw (1934) for a chicken, an English Sparrow and a duck respectively. Oka (1926) described a chick and Kříženecký (1926) a goose, each with four legs, and the latter author also gave an account of a chick with four legs and four wings. Chidester (1927) reviews the cases of four chicks and one duck, all with four legs each, and one chick having four legs and four wings. Although certain pigeons (fantails) have regularly many extra tail feathers, sometimes as high as from thirty to forty, no one, so far as the author is aware, with the exception of Kuhn (1932), has ever described a bird with two separate tails. Kuhn's case was that of a canary which had an extra tail growing from near the middle of its back. It seems worth while, therefore, to publish this note concerning a Robin with two distinct sets of tail feathers, which the author came across while examining some birds for protozoan parasites.

## OBSERVATIONS

The Robin (*Turdus migratorius migratorius*) was an immature bird, collected in Wallingford, Pennsylvania, September 15, 1936, and it was not realized until the bird was in hand that it was the possessor of an extra tail. On closer examination, one tail was seen to be of normal position and arrangement, while the other was placed so that it was the exact mirror image of the first (Plate 32, upper figure, in side view). Both possessed upper and under tail coverts, which of course, were facing in opposite directions. Neither tail, however, had the normal number of feathers. The one in the correct position contained ten, the other eleven feathers, the latter including two which were still covered with epidermal sheaths. All of these were perfectly normal tail feathers so far as structure is concerned.

With reference to the skeleton, there was no deviation from the normal down to the bones of the uropygium. Whether or not there was any change here we are unable to state because of the fact that it was deemed wisest to preserve intact the two tails with their attendant structures. This complex is still in the writer's possession.



TEXT-FIG. 1.—*Above*, the tail that was normal in position. Note the coverts, asymmetry and number (ten) of the tail feathers.

*Below*, the accessory tail. Note the coverts, and the number (eleven) of tail feathers, and the presence of the epidermal sheath in two. Slightly reduced.

## DISCUSSION

That birds with two tails must be rather rare, is evidenced by the fact that apparently only one other description of such a phenomenon has ever been published. In this case, that of the double-tailed canary (Kuhn, 1932), there were a number of curious features. The normal tail was normal in every respect, whereas the extra one was composed of only seven feathers, growing slightly to the left of the middle of the back. These seven feathers themselves were not like those of the true tail, but were bilaterally symmetrical, as are the other feathers of the back. Also, no coverts were associated with this tail and no skeletal modifications were present to support it. It, then, had few of the features of a true tail.

In the present bird, however, the extra tail was normal in the structure of the feathers, in the presence of typical coverts and in that it grew from the uropygium. It was unusual in that it was in a position which was the reverse of that of the normal tail and in that it possessed only eleven feathers. It also had one more feather than did the so-called normal tail, which was itself two short of the number (twelve) typical for the species.

In many of the descriptions of birds with extra appendages there is to be noted an accompanying change in some other morphological feature. Oka (1926) and Adams (1930) both describe extra pelves in four- and three-legged chickens respectively and Chidester (1927) noted the modification (such as two cloacas) of the alimentary canals of some of his birds with extra wings and legs. Kuhn (1932), however, found no skeletal change in his canary and the present case also involves no change in the bony structure, at least up to the uropygium.

Discussion as to how these variations arise is, of course, pure speculation. From what we know of the duplication of parts in other animals, however, it would seem that the stimulus for the production of extra legs, wings, tails, etc., must come at a very early period in the life of the embryo. The exact nature of the stimulation is still in doubt.

## SUMMARY

1. A note is made of an immature Robin (*Turdus migratorius migratorius*) possessing two tails, both of which grew from the uropygium, the lower one having ten feathers, the upper eleven.

2. The extra tail was arranged as a mirror image of the one which was normal in position.

3. Both tails possessed typical coverts.

4. No skeletal modifications were noted.

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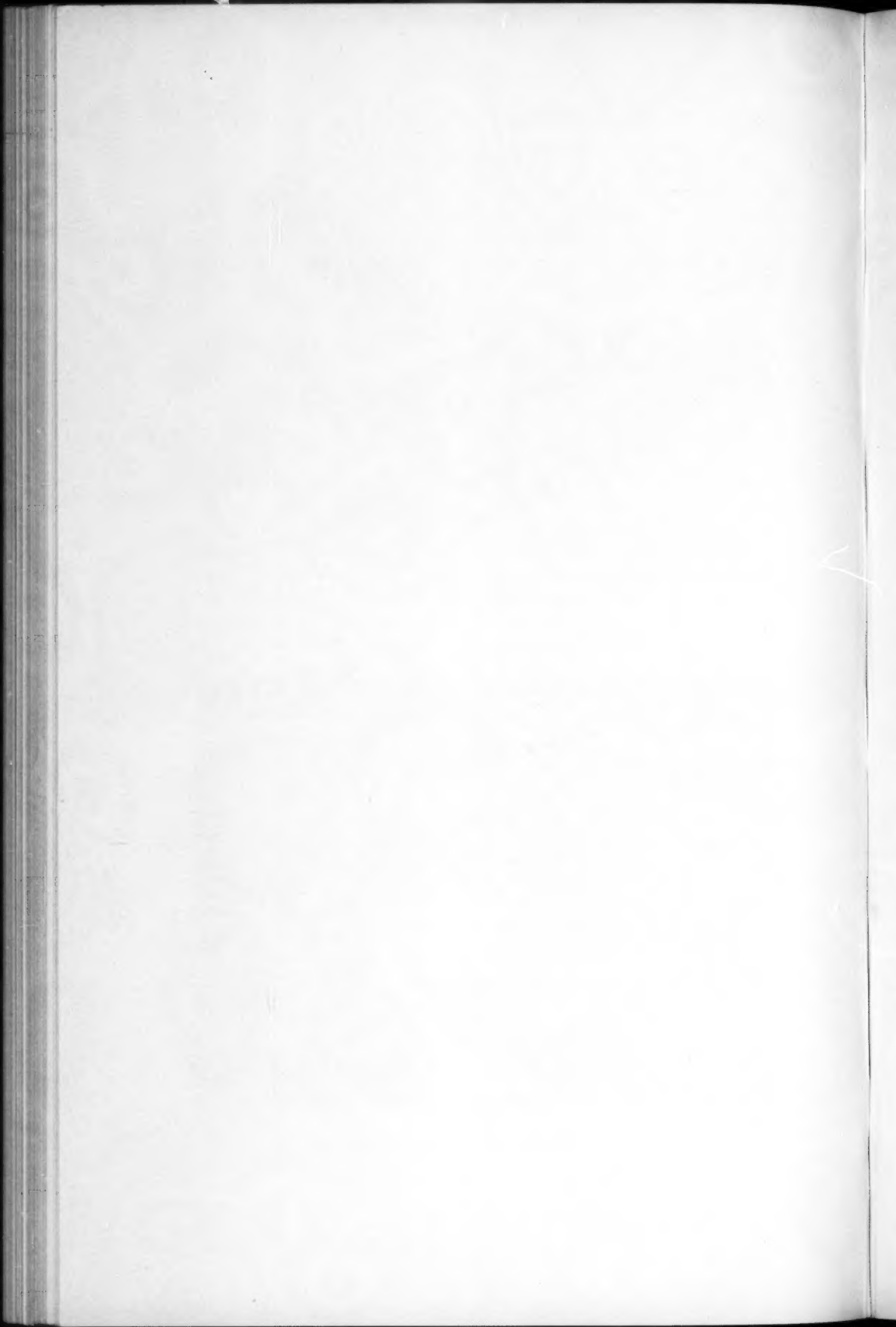
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STABLER: ROBIN WITH TWO SETS OF RECTRICES



BRASSARD AND BERNARD: WILLOW PTARMIGAN



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# WILLOW PTARMIGAN AT THE QUEBEC ZOOLOGICAL GARDENS

BY J. A. BRASSARD, D.SC.V., AND RICHARD BERNARD, M.SC.

## Plate 32 (lower figure)

DURING the years of 1932-33, the northern parts of the Province of Quebec were invaded by the Willow Ptarmigan (*Lagopus lagopus*). Opportunity was thus given us for possible adaptation and breeding of this arctic grouse in the Zoological Park. Though our results are not very conclusive as to breeding, we hope that this species will soon become as used to captivity as is the Sharp-tailed Grouse.

The birds under observation came from the following localities: Comeau Bay and Trinity Bay on the North Shore of the St. Lawrence, Lake St. John district, Amos, and La Sarre in northern Quebec. In 1934-35 the ptarmigans had entirely vanished from these places. In the usual course of events about another seven-year period must elapse before the ptarmigan will be seen again. It is during the month of November that the ptarmigan settles down in Abitibi.

The exhibition of the ptarmigans is a relatively simple matter provided that care is given to their feeding and the hygienic conditions. The birds must be protected from assuming neighbors. The important problem encountered was feeding. We thought a fair chance of success could be hoped for by following closely the diet found by the ptarmigan in its habitat. Analyses of stomach contents were naturally our first step in this endeavor.

As its name implies, the Willow Ptarmigan finds its living in willow thickets. Some thirty specimens were examined as to stomach contents. It was found that buds, twigs and catkins made up about ninety per cent of the diet of the ptarmigan during spring and summer. Unfortunately, it was impossible to secure specimens at other seasons.

The following are typical results of stomach analyses:

### SPECIMEN NO. 1 FROM COMEAU BAY

	Buds	Twigs	Catkins
15% <i>Salix nigra</i> .....	38%	59%	2%
12% <i>Salix cordata</i> .....	28%	67%	4%
66% <i>Salix rubra</i> .....	19%	79%	1%
6% <i>Salix lucida</i> .....	16%	75%	7%

### SPECIMEN NO. 2 FROM TRINITY BAY

	Buds	Twigs	Catkins
38% <i>Salix nigra</i> .....	54%	42%	3%
20% <i>Salix cordata</i> .....	25%	71%	2%
36% <i>Salix rubra</i> .....	51%	46%	2%
4% <i>Salix lucida</i> .....	31%	58%	9%

## SPECIMEN NO. 3 FROM TRINITY BAY

91% <i>Salix nigra</i> .....	79%	15%	5%
3% <i>Salix lucida</i> .....	25%	50%	25%

We see from these analyses that in the ptarmigan's diet, twigs come first, then the buds and the catkins. Of these, the buds are the most important. In each stomach, we found from one to two per cent of gravel.

The feeding problem was discouraging at first since the species of willow mentioned were rather scarce on Charlesbourg Heights. Before attempting to hunt for this particular food in the Laurentides, we tried our ptarmigans on a diet made up of the following seeds: sunflower, buckwheat, hemp, wheat, oats. Whenever possible, blueberries, cherries and mountain-ash fruits were added. During the summer of 1933, a few hundred pounds of these fruits were frozen in our refrigerator and kept in reserve for the winter months. In view of the poor results obtained in the spring of 1934, buds and twigs from willows, birch and aspen were included. This change improved the health of our birds and induced them to eat more seeds, especially when we were short of buds.

Was this adaptation to a new way of life for good? We doubt it very much since the ptarmigans suffered heavily from aspergillosis. Following is a brief account of the cases. On March, 27, 1934, seven ptarmigans from a lot of ten were shipped to us. Three died before leaving Comeau Bay. After a few days of quarantine, they were put with the others in our aviary. On April 4, a dead specimen was brought to the laboratory. Tuberculosis was at first suspected but sections and cultures revealed *Aspergillus fumigatus*. Up to May 11, a dead bird was brought in every two or three days, and the same disease confirmed. This general infection may be traced back to cohabitation during the shipping or to improper feeding. Though a few other species of grouse suffered from aspergillosis in only a slight degree, none of our granivorous birds was infected.

Two questions arise from these experiments. Is the ptarmigan naturally more receptive to aspergillosis or does the artificial diet open the way for a constantly present source of infection by impairing the health of the ptarmigans? There is no doubt that granivorous birds are generally exposed to this infection due to the fact that they find their food on the ground and consequently they acquire resistance. Ptarmigan on the other hand seek their food above the ground where moulds and microbes are less abundant. Future study will tell whether it is a question of natural receptivity or of inadequate diet.

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SIZE OF RED BLOOD CORPUSCLES AND THEIR NUCLEUS  
IN FIFTY NORTH AMERICAN BIRDS

BY PAUL BARTSCH, W. H. BALL, W. ROSENZWEIG AND S. SALMAN

No ONE in America seems to have made a systematic comparative study of the measurements of the red blood corpuscles and their nucleus, and little research in this field has been done abroad. In order to make up for the deficiency, as far as American birds are concerned, the senior author assigned to three of his advanced students at The George Washington University, the problem of measuring the red blood corpuscles and their nucleus in fifty eastern North American birds.

In the preparation of the material for examination blood smears were made in the usual way by placing a drop from a freshly killed bird on one end of a slide and quickly drawing another slide at an oblique angle across this, effecting in this way a fairly even attenuated distribution of blood over the slide. The blood was next stained with Wright's stain, then twenty corpuscles and the nucleus of each were measured. It was deemed wise to have three students do this work, in order to check up on the question of personal error. For this reason the same microscope and equipment were used by all three in measuring. The measurements here given are in microns and they show for each species the general average only of the three students.

The range of measurements discovered in the length of the red blood corpuscles in the fifty birds examined, varies from 16.5, to the least, 6.0 microns; while the short diameter ranges from 10.0 to 4.0 microns. The long diameter of the nucleus varies from 7.87 to 3.1 microns, while its short diameter was found to range from 5.7 to 1.1 microns.

The largest cell was found in the Osprey, which yielded the length 16.5 microns, while the smallest length was observed in the Carolina Chickadee, which gave a length of 6.0 microns. The greatest diameter of the cell was found in the Osprey and the Red-headed Woodpecker, both of which gave a reading of 10.0 microns, while the Eastern Tree Sparrow yielded the least diameter, namely, 4.0 microns.

In the measurements of the nucleus the largest diameter fell to the Red-headed Woodpecker, which yielded 7.87 microns, while the shortest length of the nucleus fell to the White-breasted Nuthatch and the Yellow-throated Warbler, both registering 3.10 microns. The greatest diameter of the nucleus was registered by the Red-headed Woodpecker which gave 5.7 microns, while the least diameter of the nucleus fell to the White-breasted Nuthatch and the Eastern Hermit Thrush, both of which yielded 1.10 microns.

In taking these measurements, it should be stated that one has to be careful not to select for that purpose a partly tilted corpuscle, for the oval shape of these elements would be materially foreshortened by that procedure.

It is to be hoped that this initial enterprise, which embraced 12,000 measurements, may stimulate other observers to extend these observations.

The main literature on the subject is covered by the five citations listed at the end of this paper.

## MEASUREMENTS OF AVIAN RED BLOOD CORPUSCLES

	Blood cell, average length	Blood cell, average width	Nucleus, average length	Nucleus, average width
Eastern Red-tailed Hawk, <i>Buteo b. borealis</i> .....	13.49	6.58	5.85	2.48
Osprey, <i>Pandion haliaetus carolinensis</i>	13.49	7.36	6.64	2.76
American Coot, <i>Fulica a. americana</i> ..	12.04	7.29	5.03	3.05
Barn Owl, <i>Tyto alba pratincola</i> .....	14.05	7.79	6.27	2.53
Red-bellied Woodpecker, <i>Centurus carolinus</i> .....	13.6	6.76	6.41	2.31
Red-headed Woodpecker, <i>Melanerpes erythrocephalus</i> .....	14.09	7.28	6.5	2.77
Eastern Hairy Woodpecker, <i>Dryobates v. villosus</i> .....	12.4	6.27	6.21	2.15
Northern Downy Woodpecker, <i>Dryobates pubescens medianus</i> .....	12.74	5.80	5.95	2.32
Northern Crested Flycatcher, <i>Myiarchus crinitus boreus</i> .....	11.31	6.72	5.21	2.34
Eastern Phoebe, <i>Sayornis phoebe</i> ....	10.78	5.82	4.99	2.18
Carolina Chickadee, <i>Penthestes c. carolinensis</i> .....	10.44	5.55	4.93	1.93
Tufted Titmouse, <i>Baeolophus bicolor</i> ..	10.74	5.89	5.32	1.95
White-breasted Nuthatch, <i>Sitta c. carolinensis</i> .....	11.30	5.76	5.24	2.09
Carolina Wren, <i>Thryothorus l. ludovicianus</i> .....	11.20	5.57	5.23	1.76
Eastern Mockingbird, <i>Mimus p. polyglottos</i> .....	10.98	6.15	4.88	2.12
Eastern Robin, <i>Turdus m. migratorius</i>	11.14	6.09	5.56	2.20
Eastern Hermit Thrush, <i>Hylocichla guttata faxoni</i> .....	11.88	5.55	5.68	2.08
Blue-gray Gnatcatcher, <i>Polioptila c. caerulea</i> .....	9.99	6.30	4.50	2.07
Eastern Golden-crowned Kinglet, <i>Regulus s. satrapa</i> .....	9.75	5.04	4.65	1.96
Eastern Ruby-crowned Kinglet, <i>Cor-thylia c. calendula</i> .....	10.23	5.31	4.80	2.30
Starling, <i>Sturnus v. vulgaris</i> .....	10.37	6.25	5.34	2.38

	Blood cell, average length	Blood cell, average width	Nucleus, average length	Nucleus, average width
Yellow-throated Vireo, <i>Vireo flavifrons</i>	11.20	6.32	5.30	2.23
Blue-headed Vireo, <i>Vireo s. solitarius</i>	11.20	6.07	5.18	2.34
Red-eyed Vireo, <i>Vireo olivaceus</i> .....	11.00	6.56	5.85	2.55
Black and White Warbler, <i>Mniotilta  varia</i> .....	10.84	5.97	5.06	2.18
Worm-eating Warbler, <i>Helmitheros  vermivorus</i> .....	11.25	6.08	5.42	2.33
Magnolia Warbler, <i>Dendroica magnolia</i>	10.93	6.26	5.21	2.39
Black-throated Blue Warbler, <i>Den-  droica c. caerulescens</i> .....	11.26	6.26	5.36	2.62
Myrtle Warbler, <i>Dendroica coronata</i> ..	11.02	5.96	5.26	2.38
Black-throated Green Warbler, <i>Den-  droica v. virens</i> .....	10.88	6.30	4.97	2.43
Blackburnian Warbler, <i>Dendroica fusca</i>	11.37	5.61	5.07	2.36
Yellow-throated Warbler, <i>Dendroica d.  dominica</i> .....	11.14	6.11	5.28	2.43
Northern Pine Warbler, <i>Dendroica p.  pinus</i> .....	9.7	5.86	4.81	2.45
Northern Prairie Warbler, <i>Dendroica d.  discolor</i> .....	10.76	6.25	4.93	2.13
Oven-bird, <i>Seiurus aurocapillus</i> .....	11.68	5.48	5.26	2.45
Louisiana Water-thrush, <i>Seiurus mota-  cilla</i> .....	11.70	6.04	5.55	2.36
Hooded Warbler, <i>Wilsonia citrina</i> ....	11.76	6.69	5.86	2.56
English Sparrow, <i>Passer d. domesticus</i>	11.29	5.56	5.43	2.30
Purple Grackle, <i>Quiscalus q. quiscula</i> ..	10.65	6.18	4.73	2.33
Scarlet Tanager, <i>Piranga erythromelas</i>	11.90	6.19	5.12	2.38
Eastern Cardinal, <i>Richmondia c. car-  dinalis</i> .....	11.91	5.99	5.60	2.12
Red-eyed Towhee, <i>Pipilo e. erythroph-  thalmus</i> .....	11.41	6.08	5.23	2.38
Slate-colored Junco, <i>Junco h. hyemalis</i>	11.65	5.89	5.51	2.33
Eastern Tree Sparrow, <i>Spizella a.  arborea</i> .....	10.22	5.26	5.08	1.98
Eastern Chipping Sparrow, <i>Spizella p.  passerina</i> .....	10.05	5.98	5.03	2.32
Eastern Field Sparrow, <i>Spizella p.  pusilla</i> .....	11.33	5.89	5.33	2.20
White-throated Sparrow, <i>Zonotrichia  albicollis</i> .....	11.68	5.11	5.54	2.09
Eastern Fox Sparrow, <i>Passerella i.  iliaca</i> .....	11.25	6.19	5.69	2.22
Swamp Sparrow, <i>Melospiza georgiana</i>	10.88	5.90	5.11	2.43
Eastern Song Sparrow, <i>Melospiza m.  melodia</i> .....	11.06	6.12	5.32	2.33

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## ORTHOPEDIC SURGERY ON A WHITE PELICAN

BY ELIZABETH A. OEHLENSCHLAEGER

IN the October, 1934, number of 'The Auk' (pp. 538-539) under General Notes, Mr. Walter J. Mueller, formerly of the Milwaukee Public Museum, reported on the use of anesthetics in bird surgery. It may be useful to give a more detailed history of the subsequent care, and final result of the operation, on a White Pelican (*Pelecanus erythrorhynchos*) which displayed the finest courage and intelligence. It was my voluntary and intensely interesting duty to be the 'Dukie's' nurse; his dramatic recovery created attention among local ornithologists and orthopedic surgeons. As this is his third summer's residence in our pool, it seems safe to say that the physical and mental adjustment to his one-sided condition is complete.

The 'Dukie', in point of residence, is the oldest aquatic bird in the Milwaukee Zoological Garden, to which he returns for the winter months. For seventeen years he used his seniority rights in its pool most energetically, gaining thereby a reputation for a very quarrelsome disposition, and was not at all averse to using wings and mandibles to give weight to his argument.

When the accident which robbed him of his wing occurred, it did not seem advisable to do more than temporarily set the broken member, for only one outcome seemed possible, a quick and painless end. The struggle to capture him had caused the dangling, splintered end of the humerus to puncture several pneumatocysts on the left side, lowering it considerably. A number of smaller wounds added to the distressing appearance of the pelican, and it seemed that he could only serve the purpose for which he had been sent to the Milwaukee Public Museum, of becoming one of the group of birds which were being mounted, or serving as a most dejected model. Neither plan appealed to the group of scientists and artists directly concerned; but to set the wing, to restore the bird's usefulness as a living exhibit, the lure of the 'How?', was quite another matter. The decision to help, not kill, was quickly made, and the wing was set. Amputation was not considered at this time, he was given his chance.

With the removal of the cast, three weeks later, came the definite knowledge that "the operation was not successful," and amputation was resorted to as the only way to save the bird's life. As Mr. Mueller has already described this operation, it is not necessary to repeat the details here. Shortly afterward, I visited the 'patient' in his warm, sunny corner of the Museum's roof preparation-room, and was greeted by rattling mandibles, and a group of men with warning gestures and advice to "Look out!" When several weeks later, the bird came to take up his residence in our garden pool, considerable healing had taken place, but a large area of

tissue surrounding the stump was still very inflamed, and a nearly complete paralysis of the left leg was present.

It had been the operating surgeon's advice that the pelican be placed where he could exercise the leg undisturbed by other birds, in order to avoid failure of a very interesting case.

When lifted into our pool, the bird was completely off balance. He tipped over on the uninjured side when attempting to swim, and could walk with great difficulty only, a very distressing thing to watch. For a number of days, we were fearful that weakness and paralysis together might end in his drowning some night, when no one would be near to right him. Curiously, he seemed to realize his condition. Too weak to use the wooden ramp which was placed in the pool for his convenience, he would swim, as best he could, near enough to its incline to allow me to take his mandibles in my hand and gently pull him up out of the water. All the dressings, and the one feeding of the day, were done on the lawn beside the pool. Then he was picked up and put back into the water.

There was a slow development toward a crisis; a gradual weakening, increasing listlessness and loss of appetite. All symptoms indicating septicemia were present especially since, at this time, there was an acute flare-up of inflammation surrounding the area of amputation. Arrangements were made to have the bird destroyed, but the day this unpleasant event was to occur, was the turning-point of his illness. In slow degrees his appetite and strength returned, and by the middle of July, a fair use of the paralyzed leg was noted; on occasions it was quite as efficient as the uninjured member. Whether it was habit or weakness, I never discovered, but the 'Duke of Wellington' was lifted in and out of the pool until the last day of July, when we found him serenely sitting on the stone coping. Naturally, we were delighted.

Then another difficulty arose. With the heat of July came flies. The stump of the humerus had been left with only a thin gauze dressing, and it became apparent that blow-flies had found access to the hollow bone. Sterile maggots are used in modern surgery to "clean up" certain types of septic wounds, but, sterile or otherwise, to me they are the apogee of everything that is loathesome and filthy, and I fought the condition with every available means at my command. In sheer desperation, I filled the bone-cavity, and as much of the underlying tissue as could be reached, with an antiseptic oil which is used with good results in one of the foundries of the city. As it penetrated the wound, the unwholesome tenants came tumbling out in countless numbers. Having accomplished this exodus, the next worry was,—How much added absorption would the pelican be able to withstand in his weakened condition? A few anxious days, and then a sudden spurt of improvement and strength.

Thereafter, when arriving with our pail of fish, we were met by a badly limping pelican. Daily, the distance between the bird and his "dinner-pail" was increased, compelling more activity in the lame leg. By the end of September, he could traverse the distance between the house and the pool, about 500 feet, quite readily. Usually he was, and still is, one of a group of five, that met at the kitchen-door about 4.30 afternoons, one Saint Bernard, and three Scotch terriers, a charming and interesting assembly.

This was written in August, 1936. More than two years have passed since the 'Duke' met with his accident. He is still an object of unusual interest in our sunken garden and proves himself a bird, not only of fine intelligence but of splendid memory as well. Whatever his disposition may have been with others, he takes the fish from our hands, but never, by any chance hurry, do those saw-edged mandibles close on a careless finger. There is still a very decided limp when he walks, but very little effort is made in covering the ground. His balance in the water is perfect, the jump from the side of the pool is made with the remaining wing spread out full. He uses it in the same manner when walking up and down the various terraces which he must climb and descend in his daily walks to the house for his meals. When feeling particularly well, he will suddenly spread his wing and run about the lawns of the garden, his gait at such times having very much the rhythm of a single-footed horse. He comes when called, and seldom fails to meet the family when it arrives home during the afternoon. It is rather startling to see him in the midst of a group of barking, jumping dogs, brushed by their tails, bumped here and there, never belligerent, waiting for the fish that come, as he knows, from our hands only.

Friendly as he is during the day, he is distinctly on the defensive at night, nor does he seem to recognize my voice as the one to which he pays such good attention at other times. He does not leave his resting-place when approached in the dark, but strikes out savagely with wide-open mandibles, and a deep guttural croak. I have reason to remember that any effort on my part to change this nocturnal attitude may be distinctly painful.

Three young Black-crowned Night Heron nestlings shared the pool-coping during part of the last two summers. The 'Duke' did policeman's duty, keeping them away from what he considered his own domain, but eventually recognized the futility of his efforts. When he got close enough to inflict injury, the herons either ran, or, as they matured enough to use their wings, flew away or across the pool to the other side.

At this time, he developed a distinct trait of jealousy which caused much amusement. Normally, he would never swallow a fish with a broken skin or one which was in any way mutilated. The herons were fed small pieces, but if a chance bit of fish were left lying either on the coping or on the

ramp, our fastidious friend would spend minutes in his efforts to pick them up. These efforts were grotesquely funny. He did not cease trying until he had accomplished his purpose. And there was a twinkle of triumph in his knowing eyes as he sailed off over the pool's surface to drink and wash the fishy taste out of his mandibles!

Orthopedic surgery on a White Pelican has proven to be a most interesting study, surgically, humanely, and ornithologically. The stump of the amputated wing is completely hidden under a fine coat of plumage, and it seems fairly certain at this time, that the 'Duke of Wellington' will give our garden an added charm by his presence for years to come.

This year he has become distinctly a 'family' pelican, always joining its members and guests on the terrace facing the sunken garden. He steps up to the low table on which the pre-dinner refreshments are served, and views them with a critical air. We have become accustomed to his presence sufficiently to provide a special 'cocktail' for him in the form of a few small fish. After he has disposed of them, he will either remain one of our group or descend the one low step to the flagged walk, there to preen with very evident contentment and comfort, until we go in to our dinner. It is always a thrilling experience for guests to see the huge, grotesque bird come to us without fear or distrust, and to us, who have worked for him and with him, he has become an object of very warm affection and beauty.

Somewhere in his instinctive memory there must be a picture of Pyramid Lake. When the wind blows off Lake Michigan, he will walk to the top of the hill which overlooks the water. Pulling in his neck, and crouching down, he will catch the stiff breeze in his good wing, and for minutes at a time indulge in flight exercises which also give a peculiar rotary motion to the visible end of the humerus. There is a touch of pathos in his action, which to us who are so fond of the 'Dukie' has its compensation only in the fact that "greater love hath no one" for him, or could give him better care.

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## NOTES ON COLORADO BIRDS

BY ALFRED M. BAILEY AND ROBERT J. NIEDRACH

IN going over the collection of the Colorado Museum of Natural History, we have found a few birds which should be recorded, among them some old specimens secured from the State Historical Society's collection.

COMMON LOON, *Gavia immer immer*.—Published records from Colorado probably refer to *elasson* described by Bishop (1921). We have examined skins in various State collections, and all that we have measured have been this small western form, except one in our own series, an unsexed immature (C. M. N. H. no. 7807), taken at Brighton, Adams County, November 7, 1922, by F. J. Smith. It measures as follows: wing, 380 mm.; culmen, 78; depth of bill at base, 25; tarsus, 85. It is such a large bird that it greatly resembles the immature *adamsi* except for the shape of its culmen.

WESTERN GREBE, *Aechmophorus occidentalis*.—Bergtold (1928) lists this as a rare migrant and mentions six records, apparently on the basis of the list compiled by Sclater (1912). While there are comparatively few specimens in collections, the birds are not as rare as has been indicated. From the Historical Society's collection we have the first record for the State (C. M. N. H. no. 15401) taken at Denver, October 25, 1888 (Smith, 1895). In addition, we have five other birds from the State: a male (no. 391) was collected in Huerfano County, on November 28, 1908, by A. W. Scarlet and another (no. 6021) was taken on Mud Lake, Adams County, October 29, 1916, by E. H. Osler; a female (no. 7514) was killed by a hunter in Weld County, November 16, 1919, and another (no. 9362), an interesting winter record, was collected on December 27, 1921, at Ault, Weld County, by G. J. Rants; R. L. Landberg, of the Museum Staff, collected a female (no. 12241) at Fort Morgan, Morgan County, September 3, 1932, and R. B. Rockwell and the undersigned saw a mated pair at Barr Lake, Adams County, on May 24, 1936. Niedrach observed one in the same locality April 24, 1937.

DOUBLE-CRESTED CORMORANT, *Phalacrocorax auritus auritus*.—Cormorants have been considered rare birds in Colorado and there are few in State collections. We have but four specimens as follows: immature male (no. 2134), taken at Barr, Adams County, on September 14, 1913; immature male (no. 9882), taken at Deertrail, Arapahoe County, on October 15, 1922; adult female (no. 12391), taken at Barr, Adams County, April 22, 1935; and adult male (no. 12250) taken at Barr, Adams County, on June 1, 1931. The last mentioned was collected with a set of eggs by Niedrach and Rockwell, and is the first nesting record for Colorado. There were eight occupied

nests, and at least five pairs succeeded in rearing their young. Three young were captured and placed in the lake at the City Park Zoo. Two were killed, however, because they developed the habit of eating young ducks, according to the keeper, who said the cormorants would dive and pull the young ducks from sight.

WOOD IBIS, *Mycteria americana*.—There are few records of this straggler. Slater recorded the first specimens for the State, taken by L. L. Llewellyn: an unsexed bird and an immature male collected August 30, 1902, near Fort Logan, Arapahoe County. These are now in our collection and are numbered 7417 and 14711, respectively. F. G. Brandenburg and G. P. Young, of the Museum staff, collected an immature female (no. 12379) near Aurora, Adams County, July 25, 1934.

AMERICAN EGRET, *Casmerodius albus egretta*.—An adult female was taken at Barr, Adams County, on April 29, 1933 (no. 12368). This is a rare species in the State, apparently, and this specimen is the only one from Colorado in our collection.

WHITE-WINGED SCOTER, *Melanitta deglandi*.—There are five specimens of this straggler in our collection from Colorado, as follows: immature female (no. 2989), Longmont, Boulder County, November 15, 1913, collected by W. S. Hurd; adult female (no. 6865), Denver, October 21, 1917, collected by V. N. Borchardt; immature male (no. 14189), immature female (no. 14190), and immature male (no. 14191), Red Feather Lakes, Larimer County, November 5, 1927, collected by Floyd Phipps.

SURF SCOTER, *Melanitta perspicillata*.—Two old skins from Colorado recently secured from the State Historical Society's collection are: adult male (no. 14706), Barr, Adams County, October 22, 1899, collected by L. B. Meek; adult male (no. 16204), Loveland, Larimer County, October 31, 1899, collected by H. A. Flynn. Three other specimens have been added to the collection in recent years: adult female (no. 11884) and immature male (no. 11885), Milton Reservoir, Weld County, October 22, 1929, collected by H. Wilson; adult female (no. 12236), Barr, Adams County, November 6, 1932, collected by Rockwell.

BROAD-WINGED HAWK, *Buteo platypterus platypterus*.—Only two specimens have been taken in the State. A female collected at Colorado Springs in May 1926, now in the Colorado College Museum (C. C. 5817), was recorded by Aiken (1927). The other specimen is an immature female (no. 12386), which was taken in City Park, Denver, by R. J. Niedrach. Three birds were observed in a grove of trees one hundred yards south of the Colorado Museum of Natural History, in City Park, by Niedrach on May 11, 1934, and they remained in the vicinity until early June; they were again seen on May 18, 1935, and they stayed until June 1, after which they were not noted. Niedrach was in Central America during the spring of

1936, but Brandenburg reported several birds in the same locality during early May.

AMERICAN WOODCOCK, *Philohela minor*.—The Woodcock has been recorded for the State only a few times. The first reference is by H. G. Smith (1886), who saw a mounted specimen in a gun store in Denver. The old mounted bird, which was taken near Denver about August 9, 1885, was recently donated to the Museum and has been made into a skin (no. 14760).

SABINE'S GULL, *Xema sabini*.—Two immatures have been secured in recent years; a female (no. 12263) from the western slope near Fraser, Grand County, October 21, 1932, and a male immature (no. 12545), from Barr Lake, Adams County, October 10, 1928.

ATLANTIC KITTIWAKE, *Rissa tridactyla tridactyla*.—The occurrence of the Kittiwake in the State has been based upon unsatisfactory evidence of a specimen in Mrs. Maxwell's collection which was supposed to have been taken in Boulder County, in December, prior to 1874 (Sclater, 1912). R. L. Landberg collected the second known specimen for the State, an immature male (no. 12262), near Fort Morgan, Morgan County, on November 13, 1932.

FLAMMULATED SCREECH OWL, *Otus flammeolus*.—An adult female (no. 12700), with a set of three eggs, was collected in Eagle County, on June 6, 1933, by Don Brown.

EASTERN HAIRY WOODPECKER, *Dryobates villosus villosus*.—An adult female (no. 14783) was collected at Parker, Douglas County, on December 5, 1936, by F. G. Brandenburg. We have seven specimens from the eastern part of the State but this is the first from near Denver.

EASTERN PHOEBE, *Sayornis phoebe*.—This species has been recorded twice: a specimen taken by G. Thorne at Fort Lyon, Boulder County, April 20, 1884 (Sclater, 1912), and a male taken in Pueblo County, April 5, 1896 (W. P. Lowe, 1914). G. P. Young and F. G. Brandenburg collected a third specimen, a male (no. 12353), on April 26, 1933, in Adams County, close to Denver.

SCISSOR-TAILED FLYCATCHER, *Muscivora forficata*.—Bergtold (1928) gives "two dubious records; sight identification." We have two females (nos. 16348, 16349) as the first definite records for the State, taken in Baca County, near Campo, on May 31 and June 1, 1923, respectively, by R. J. Niedrach.

GRAY VIREO, *Vireo vicinior*.—The only record for the State is that of H. G. Smith (1908), who collected two pairs in Prowers County between May 16 and 20, 1907. Three of these were obtained by the Museum when the State Historical Society's collection was distributed (nos. 12735, 14583, 14584).

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## A NEW RACE OF FINSCH'S PARROT

BY ROBERT T. MOORE

FOR some time I have been aware that *Amazona finschi* (Sclater), like so many species of the parrots of southwestern Mexico, has a northern race. Publication was delayed until more specimens could be secured to confirm the racial characteristics.

*Amazona finschi woodi* subsp. nov.

*Type*.—Adult male, No. 4332, collection of Robert T. Moore, from Guirocoba, 28 miles southeast of Alamos, Sonora, Mexico; May 6, 1931. Collected by J. T. Wright.

*Subspecific characters*.—Nearest to *Amazona finschi finschi* (Sclater) of Oaxaca but green of plumage less yellow, varying from 'spinach green' to 'lettuce green' as compared with 'parrot green' to 'calliste green' of *finschi*; 'Pompeian-red' band on forehead narrower, more restricted and somewhat duller; size somewhat larger. (Colors according to Ridgway's 'Color Standards and Color Nomenclature,' 1912.)

*Range*.—Extreme southeastern Sonora and southwestern Chihuahua, south to Babizos in the mountains of east-central Sinaloa. Although found in the southern part of its range from sea level to 6500 feet, typical *woodi* in Sonora and Chihuahua seems to be restricted to the higher elevations.

*Specimens examined*.—*Amazona f. woodi*: SONORA, 2 ♂, 1 ♀, Guirocoba; 1 ♂, Alamos. SOUTHWESTERN CHIHUAHUA, 1 ♀, Arroyo Hondo. SINALOA, 1 ♂, 2 ♀, Santa Gertrudis; 2 ♀, Babizos; 1 ♂, El Molino; 1 ♂, 1 ♀, San Ignacio; 1 ♀, Sierra Palos Dulces. DURANGO, 1 ♂, Chacala.

*Amazona f. finschi*: OAXACA, 1 ♂, Tehuantepec City. COLIMA, 1 ♂, Amiena; 1 ♂, "Colima." MICHOACAN, 1 ♀, Las Palmas; 1 ♀, Vol. Jorullo. JALISCO, 1 ♂, Barranca Veltran; 1 ♂, Las Palmas. SINALOA, 1 ♂, 2 ♀, Rosario; 2 ♀, near "Mazatlan." INTERGRADES, SINALOA, 4 ♂, 2 ♀, Rancho Santa Barbara, altitude 2500 feet.

*Remarks*.—In exchange for the right to describe one of two forms, which both of us independently had determined should be named, Mr. van Rossem proffered me the note concerning his examination of Sclater's type of *Chrysotis finschi* in the British Museum. He writes: "Sclater's type is without definite locality, but is one of the smaller, richly colored birds, and undoubtedly came from a southern point." Tehuantepec, Oaxaca, could properly serve as the type locality, since birds from that area have the 'yellow-green' coloration of the type. I therefore suggest it as such.

A single bird from the coast near El Molino in northwestern Sinaloa seems to be closer to *woodi*, but in southern Sinaloa the individuals from the coastal plain, except for larger size, are typical *finschi*, whereas those of the mountains from 2000 feet elevation and higher are intergrades, some resembling *woodi* and others *finschi*. Specimens from Chacala, Durango, are nearly typical *woodi*. *Finschi* is the Arid Tropical race of the coastal plain while *woodi* in typical form is an Upper Austral and Transition Zone representative of the higher mountains.

The measurements of the wing obtained by Ridgway ('Birds of North and Middle America,' part 7, p. 245) seem to have been reached by flattening the wing, but show the same differences. Wings of males of *woodi*, according to my measurements, average about five per cent longer, namely, 10.5 mm. more. But van Rossem's measurement of the type of *finschi* indicates a much greater difference.

It gives me unusual pleasure to name this new race for Dr. Casey A. Wood, whose indefatigable labors in ornithology, as well as his interest in the Psittacidae are known to all, particularly to his more intimate friends, who hold him in especial esteem.

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## GENERAL NOTES

**Leach's Petrel off coast of Venezuela.**—On April 1, 1937, we sailed from Port au Spain, Trinidad, and after passing through the famous Dragon's Mouth, steamed westward at half speed about fifteen miles off the Venezuelan coast, aiming to reach Carupano at daybreak the next morning. About 11 p. m. a passenger rushed into the library and informed me that a strange bird was flopping about on the deck. I had no difficulty in catching a Leach's Petrel (*Oceanodroma leucorhoa*), alive and uninjured, which promptly ejected an oily fluid from the mouth. The bird was carefully examined; the strikingly forked tail and only lightly black-tipped tail coverts definitely eliminated the possibility of *Oceanodroma castro*. It appeared both bewildered and attracted by the steamer's lights. Twice in succession I tossed it gently overboard, and after flying out of the circle of light from the steamer, it promptly came back and flopped on the deck all over again. The third time I carefully folded the wings in the normal position of 'at rest,' and grasping it firmly in my fist, threw the bird head first with all my force as if it were a baseball. This treatment cured the petrel of its attraction for the steamer's lights, as it shot out of the illuminated area, and disappeared for good into the blackness of the tropical night. According to Murphy's 'Oceanic Birds of South America,' Leach's Petrel has been recorded off the Guianas and Trinidad, but this is apparently the first record from the more 'inside' Caribbean area.—LUDLOW GRISCOM, *Museum of Comparative Zoology, Cambridge, Mass.*

**Little Blue Heron trapped by a clam.**—A Little Blue Heron (*Florida caerulea*) in white plumage, was taken on Matanzas Inlet, Florida, with one toe securely held between the closed valves of a large clam. Caught in such a trap, the bird was captured without difficulty. From this illustration it is easy to understand one reason, and perhaps the chief reason, why so often shorebirds are seen hopping about on one leg. So caught, they must struggle and flutter until they free themselves, leaving the broken member behind. This is a menace to which they are frequently exposed.—JOHN B. SEMPLE, *Sewickley, Penn.*

**Little Blue Heron on salt water.**—In 'The Auk,' for October, 1936, page 440, in discussing the feeding habits of some of Ardeidae, Mr. E. A. McIlhenny, of Avery Island, Louisiana, concludes his interesting observations with this statement: "The other varieties of herons and egrets go to the tidal flats for food, but the Little Blue never hunts its food in salt water." The natural inference from the context is that Mr. McIlhenny is speaking only for Louisiana, but even so, one would consider it safer to pronounce the statement as a rule that sometimes has exceptions. This statement leads the writer to make the following comments in view of the fact that there are others who seem to have the strongly rooted idea that this species shuns salt water and the ocean. It has been a source of intense surprise to me that some of this country's foremost and most capable ornithologists have definitely precluded this heron from salt-water sections both as a feeder and as a nester. Such statements as the following appear in the literature: "It is rarely if ever common along the sea beaches of the coast"; "I have never found it breeding anywhere near salt water." While it is true that the Little Blue Heron favors inland ponds and swamps, it is by no means confined to such. The writer's life has been spent in coastal South Carolina, where the species is a permanent resident and where, if in no other section, it not only feeds commonly and consistently on "de salt," as the negroes put it, but breeds abundantly as well.

The great salt marshes, estuaries and creeks from at least the vicinity of Georgetown, South Carolina, down to Jacksonville, Florida, are frequented by Little Blue Herons (*Florida caerulea*) the year round. I have seen the bird not only feeding in the gullies left on the ocean beaches by the ebbing tide, but actually in the surf itself, wading as deep as the belly, and retreating before the incoming waves much as do some of the sandpipers. This habit is shared by the Snowy Egret (*Egretta thula thula*). Within a distance of thirty miles north and ten miles south of the city of Charleston, there are four rookeries of herons nesting either on barrier islands, marsh hammocks, or wooded sloughs within from a stone's throw of the ocean to a mile or two from it. In all of these rookeries the Little Blue Heron is present; in some, many hundreds of pairs nest annually. The most striking of these is a small oyster bank in Bull's Bay, of only an acre or so in extent and boasting a growth of salt-water myrtle (*Baccharis* sp.) about eighteen inches high. Among this small vegetation there have been as many as two to three hundred nests of this species. The bank is about two miles from the mainland, entirely surrounded by waters of the Bay and is virtually in the ocean itself.

It is hardly to be supposed that South Carolina and Georgia are the only sections of the Little Blue Heron's range where it resorts regularly to salt water, but such seems to be the case. The writer works a good deal in Florida and has noted that the species is certainly uncommon about salt water in that State, though it is met with in such situations. Compared with the Louisiana and Snowy Herons it is uncommon. It nests on the barrier islands of the Georgia coast as well as on the South Carolina shoreline. And so, in view of the belief which seems to be so prevalent that it is not a salt-water bird, it may be well to record the above for, in some sections of its range, it is as much at home among the marshes and the islands as are the other small herons.—ALEXANDER SPRUNT, JR., *R. F. D. No. 1, Charleston, S. C.*

**Nesting of the Flamingo in the United States.**—The question of whether the Flamingo (*Phoenicopterus ruber*) ever nested in the United States has long been a moot one. There seems to be no authentic record in the literature of its ever having done so; therefore, the following is of very considerable interest.

In the writer's work for the Audubon Association, he frequently gets into the Florida Keys and has talked with many of the 'old-timers.' Some of these men know the country and the birds as well as any ornithologist who ever visited the region, and when they make a statement as to occurrence, it is definite. In 'The Auk' for April, 1937, page 207, the writer lists the occurrence of the Dovekie (*Alle alle*) in the Keys during December 1936. One of the observers of this remarkable occurrence was Judge E. R. Lowe of Tavernier. Later this year, the writer ascertained that this gentleman was possessed of information regarding the actual nesting of the Flamingo, and secured the following from him. In the spring of 1901, Judge Lowe was stationed at the Key West Barracks and, during the latter part of March of that year, or early April, he secured leave to cruise among the Keys. While he and two companions were camped on Sugarloaf Key (Lower Keys), he was investigating his surroundings, and one morning, "walked back over a sand ridge and saw, across a pond, on an island, a number of large pinkish birds, about forty or fifty, many of which were standing straddle of what I took to be whitish stumps . . . at that time I did not know it was unusual for Flamingoes to nest in the Keys, and to me it was just another tropical bird."

The "stumps" were of course, the characteristic mud nests of this species, and many of the birds were sitting upon them. Those standing "straddle" probably saw Mr. Lowe appear over the ridge and were just arising from the nests. It is

interesting to note that this nesting colony was observed just a year previous to the flock of a thousand birds seen by Reginald H. Howe, Jr., near Cape Sable, and mentioned in Howell's 'Florida Bird Life,' page 123. Howe's observation was in March, 1902. As Howell points out, it is strange that the "peculiar mud nests" were not observed by someone in south Florida if the species nested regularly. Probably the birds did not nest regularly, but only sporadically, and if they confined these activities to the Lower Keys in the latter part of the last century and the first of this, they inhabited a region seldom visited by ornithologists, so that the presence of the nests could easily be missed. The natives probably did see the nests at times, but as Judge Lowe did, gave no thought to them. To them it was "just another tropical bird." It is the writer's opinion that the Flamingo certainly nested in the Lower Keys at times during the early part of this century and that it probably never did breed on the mainland of Florida at all.—ALEXANDER SPRUNT, JR., *Supervisor Southern Sanctuaries, Charleston, S. C.*

**Migrating Snow Geese in northern New Jersey.**—In 'The Auk,' (vol. 50, page 352, 1933) C. K. Nichols records a migrant flock of Greater Snow Geese (*Chen hyperborea atlantica*) seen at Troy Meadows, New Jersey, on April 2, 1933, and follows with an excellent discussion of the spring migration of this race showing that the flight is mainly overland, with the scarcity of records largely due to the height at which the flocks fly. It seems worth while therefore, to record the following observation by the writer. On the morning of April 13, 1937, I stepped into the yard of my residence at Union, New Jersey, and scanned the sky in hope of possible migrants, but far beyond my expectation was the big, snowy, double V that appeared high up, just west of the zenith. Apparently the birds were higher than those seen by Mr. Nichols, for the black wing-tips were hardly discernible without the binocular. However, the flock was of similar size, about one hundred birds. The weather that morning was fine and clear, and entirely favorable for migration. The difference in date is interesting in that it shows the annual variation in the departure date for birds leaving the Delaware Bay concentration, of which these seem surely to have been a part.

This also adds the subspecies to the birds of Union County, New Jersey, at least as a sight record based on the assumption that the flock had left the Delaware Bay group that morning, for while C. A. Urner has recorded the Lesser Snow Goose as taken on the Newark Meadows in his excellent county list, he knows of no previous occurrence of *atlantica* in this area.—ALFRED E. EYNON, *Union, New Jersey.*

**Greater Snow Goose in New Hampshire.**—On April 15, 1937, at about 11.00 a. m., a flock of seventy-odd Snow Geese (*Chen hyperborea atlantica*) appeared at Forrest Lake in Winchester, New Hampshire, giving an appearance of being badly lost in the prevailing heavy fog at the time. The birds were very shy. They became frightened and flew, only to return in an hour's time, when they alighted on ice in the center of the lake. An immature male was collected by Mr. Luman R. Nelson, and, incidentally, has been preserved by him. There are no former records, and the older residents in this locality cannot recall ever having heard of any white geese seen here. When they left Forrest Lake the flock of geese went to Wilson Pond in Swanzey, about eight miles distant in a northeast direction; and on being disturbed there, it is not known where they went.—LEWIS O. SHELLEY, *East Westmoreland, N. H.*

**European Widgeon in Florida.**—Through conversation with duck hunters in April, 1934, I learned that a European Widgeon (*Mareca penelope*) had been taken

December 26, 1931, on Orange Lake, near McIntosh, Florida. The bird was mounted by a local taxidermist, and through the help of several hunters it was finally located. Although the head is missing, the bird is easily identifiable. It is now in the collection of the Department of Biology, University of Florida. This is the fifth specimen of the European Widgeon that has been taken in Florida, and the locality is the second recorded for the species in the State. A. H. Howell ('Florida Bird Life,' p. 135) mentions four specimens. Three are from Titusville, but no locality is given for the fourth.—ROBERT C. McCLANAHAN, *U. S. Biological Survey, Washington, D. C.*

**European Teal at Lexington, Virginia.**—On April 11, 1937, as I was looking at the Big Spring Pond near Lexington I noticed a teal duck with the same general characteristics as the other teal ducks, but lacking the white bar before the wings that the Green-winged Teal bears and having a definite white patch above the forward edge of the wings. The author was accompanied by Robert Smith and W. W. Grover. All three of us made a careful study of the bird with an eight-power binocular and took individual notes which we then compared. This is the second record of the European Teal (*Nettion crecca*) at the same pond in two years. Dr. J. J. Murray collected a specimen from here last winter.—J. SOUTHGATE Y. HOYT, *Lexington, Virginia.*

**Early nesting of the Wood Duck.**—On the morning of April 25, 1937, while walking through a wooded section along the Hackensack River near Riverdale, Bergen County, New Jersey, I concealed myself to watch two male Wood Ducks (*Aix sponsa*) that were floating toward me down the stream. Closely following the drakes was a female around which were huddled eight young, apparently out of the nest but a few days. They must have suspected my presence for, when directly opposite me, the males flew; but the female and young turned sharply to the other bank where she went ashore and disappeared in the bushes, closely followed by her brood. Considering the normal period of egg laying and incubation of the Wood Duck, the first egg must have been deposited about the 15th of March, a date considerably earlier than any other records north of the southern States that I have been able to find.—CHARLES K. NICHOLS, *Ridgewood, New Jersey.*

**A Wood-Duck marsh in northwestern Iowa.**—Field studies in the vicinity of Ruthven, Iowa, have now been conducted by Iowa State College and cooperators since the summer of 1932. Incidental to these studies, the evident partiality of Wood Ducks (*Aix sponsa*) for Round Lake, a marsh of about 450 acres, has been observed with considerable interest, particularly by Mr. Logan J. Bennett and myself. The marsh commonly had from two to four feet of water in the deeper parts and supported various growths of vegetation, chiefly of bulrushes (*Scirpus* spp.), cat-tail (*Typha* sp.), reed (*Phragmites communis*), and pondweeds (*Potamogeton* spp.). Habitats dominated by reed and pondweeds were conspicuously favored by the Wood Ducks throughout the months that they remained in the locality.

While the largest number of Wood Ducks were to be noted in August and September, the species was strongly represented during the summer months as well. It is doubtful if there have been less than thirty individuals on the marsh at any time of the summer since our observations began; and the 1935 and 1936 summer populations surely were strongly in excess of that number.

The summer-resident birds were of both sexes and apparently non-breeders. Apart from the behavior of a pair that frequented for a time in 1936 the vicinity of a clump of willows on the shore in which there were cavities and old crow nests, nothing

indicative of reproductive effort was seen. The marsh was worked very intensively from 1934 to 1936 in connection with other studies, but few broods of any kind of ducklings were encountered and none at all of Wood Ducks. Floating mats of reeds and rushes and muskrat lodges were consistently used as sitting and preening places, however. Late summer was attended by an appreciable influx of the birds. It is the opinion of Mr. Bennett and myself that the numbers of Wood Ducks to be seen on Round Lake in early fall have been steadily increasing since our initial observations in 1932, although we have few actual data on relative populations.

In September, 1936, there was a heavy concentration of ducks on Round Lake, made up mostly of Blue-winged Teal (*Querquedula discors*), but Wood Ducks were almost as numerous as the second most abundant duck for this season, the Pintail (*Dafila acuta iztzihoa*). At the height of this concentration, the author and his wife, paddling a canoe, could flush Wood Ducks at random from the reed patches (to which they were ordinarily somewhat restricted) at an estimated rate of about three birds per 2,500 square feet. About 39 acres of the marsh were covered by the reed patches, which should give us about 2,040 Wood Ducks, a figure we do not feel to be excessively wide of the truth.—PAUL L. ERRINGTON, *Iowa State College, Ames, Iowa*.

**Canvas-back breeding in Iowa.**—On June 15, 1934, at Mud Lake, Clay County, Iowa, the writer found a submerged duck nest that contained eight eggs. Upon examination three of the eggs proved to be those of the Redhead (*Nyroca americana*), four were those of the Canvas-back (*Nyroca valisineria*), and one egg was not identified. The nest had been submerged at the time the ducklings were beginning to come out of the shells. The ducklings were removed from the pipped shells to identify them properly. The writer found 47 Redhead nests from 1932 to 1936 in northwestern Iowa, but apparently this finding of the Canvas-back eggs is the first breeding record of the bird in the State. The Canvas-back ducklings and eggshells are now in the possession of the Zoology and Entomology Department, Iowa State College, Ames, Iowa.—LOGAN J. BENNETT, *U. S. Biological Survey, Ames, Iowa*.

**Prairie Sharp-tailed Grouse budding on wild plum.**—On February 15, 1937, I had the good fortune of observing six Sharp-tailed Grouse (*Pedioecetes phasianellus campestris*) budding on the native wild plum (*Prunus americana*). They were feeding rapidly as they walked easily about on the closely matted top of the plum thicket. Observations were made through a six-power binocular from a distance of seventy-five yards, so there is no question as to the birds' activity.

The plum growth was on the edge of a mixed native stand of bur oak (*Quercus macrocarpa*), green ash (*Fraxinus pennsylvanica* var. *lanceolata*), American aspen (*Populus tremuloides*), cottonwood (*Populus deltoides*), balsam poplar (*Populus balsamifera*), red-osier dogwood (*Cornus stolonifera*), junberry (*Amelanchier oblongifolia*), choke cherry (*Prunus virginiana*), elm (*Ulmus americana*), wolfberry (*Symphoricarpos occidentalis*), hazelnut (*Corylus americana*), blackhaw (*Viburnum lentago*), hawthorn (*Crataegus chrysocarpa*), and meadowsweet (*Spiraea salicifolia*). Within a very short flying distance, paper birch (*Betula papyrifera*), ironwood (*Ostrya virginiana*), speckled alder (*Alnus incana*), and high-bush cranberry (*Viburnum americanum*), occur in abundance. The timber growth is immediately adjacent to or bordering the South Branch of Park River.

The incident was new in my observation of the Sharp-tailed Grouse and did not recall to mind any known previous reference in literature to budding on wild plum. Upon returning from the field, I reviewed the literature in my meager library which

includes, 'Life Histories of North American Gallinaceous Birds' by Arthur Cleveland Bent; 'Game Management' and 'Game Survey of the North Central States,' Aldo Leopold; and 'Winter Food of the Sharp-tailed Grouse and Pinnated Grouse in Wisconsin' by Frank J. W. Schmidt. The only reference made to Sharp-tailed Grouse budding *Prunus* was in Schmidt's review of D. A. Dery's 'Preliminary Report on the migration in Quebec of the Northern Sharp-tailed Grouse' (Bull. Quebec Zool. Soc., no. 1, 1933) in which mention is made that cherry buds are among its winter foods.

Since so many of the apparently preferred winter foods (buds of ironwood, birch, aspen, willow, balsam and cottonwood as observed by Schmidt, Judd, Coues, Dery and Bent), were available to the birds in the immediate vicinity, the observation bears some significance. Acknowledgment directly to the writer or in 'The Auk' of similar substantiating observations on the above report will be appreciated.—ADRIAN C. FOX, *Park River, North Dakota.*

**Incubation period of Virginia Rail.**—In a cat-tail swamp in Wildwood Lake, Harrisburg, Pennsylvania, I found a nest of a Virginia Rail (*Rallus limicola limicola*) and was able to determine the incubation period of this species as twenty days. When first seen on the morning of May 12, 1937, the nest contained four eggs; the next morning five eggs were present. On May 25 there were eight eggs, the maximum laid, which means the last egg was laid May 16 and incubation was begun May 17. When seen on May 12 at about 9:30 a. m., three eggs were cold and one warm, indicating that the mother bird sat on the nest only long enough to lay an egg, and suggesting that no incubation would be started until all eggs were laid. This latter theory is supported by the equal development found in the downy embryos. It is, of course, advantageous for such birds to be hatched all the same day. The nest was not the flattened mat of reeds as often described in books, but resembled an enlarged Red-wing's nest, being lined with dead grass inside a cup of reeds, four inches in inside diameter and four inches deep. It was attached to old cat-tail stalks, six inches above the water. The eggs were elliptical, creamy white with many purplish and fuscous dots, most numerous about the larger end. Seven eggs all measured exactly the same, 34 by 25 millimeters, and one egg was 32 by 24 mm. The smaller egg was later found to be infertile, showing no incubation whatever. At one visit one egg was found outside the nest and was replaced, but it was not determined which egg this was. When visited May 24, the female bird was sitting on the nest and remained there about two minutes while I stood only three feet away looking at her. Then she moved off absolutely noiselessly. So as not to frighten her I stayed away from the nest until hatching time was supposed due. On May 31 and June 1 the eight eggs were seen and found warm. On June 3 the nest was again visited and one side found broken down and the clutch destroyed. Three whole cold eggs, a downy embryo with its legs eaten off, parts of another eaten bird and broken eggshells were found. The eggs had been broken and showed indented edges as though punctured by a round instrument, perhaps the mother's bill, although I had seen three blacksnakes in the same swamp. Since the eggs were cold, it is doubtful if the destruction occurred that morning. In the afternoon I again visited the nest and found more destruction. Four embryos were whole enough to show that their development was equal, that incubation began the same day for all. The eggs contained no nourishment whatever, the vitelline sac was entirely empty; neither was any stored nourishment found within the dissected body. The birds were ready to hatch. Mr. Frederick C. Lincoln after seeing an embryo declared it certainly would have hatched within two days, probably one. I believe they would

have hatched in one day, making the incubation period for this Virginia Rail twenty days.

Audubon states that the Virginia Rail lays four or five eggs, seldom more than six or seven, and does not give the incubation period. Forbush does not record the incubation period, nor does Dr. W. H. Bergtold in his 'Study of the Incubation Periods of Birds.' Thomas R. Gentry in his book, 'Nests and Eggs of Birds of the United States,' 1882, wrote: "The number of eggs laid ranges from 6 to 10. These are deposited in daily installments of one, the first being usually extruded on the third day subsequent to the completion of the nest. The female takes to the nest almost immediately after the last egg is laid and continues for a term of 15 days." I have found no other record of this incubation period.—HAROLD B. WOOD, M.D., Harrisburg, Penna.

**Golden Plover in Florida during winter.**—On January 17, 1937, an American Golden Plover (*Pluvialis d. dominica*) was collected on the shore of Big Lagoon, about a mile east of Gulf Beach, and eighteen miles southwest of Pensacola. The bird was in the company of three Black-bellied Plovers, with which it was compared before collecting, and a mixed flock of Piping Plovers, Cuban Snowy Plovers, and Sanderlings. From all appearances the Golden Plover was not injured in any way. Before it could be collected, it flew at least four miles, and there was nothing in its flight to indicate injury. When it was skinned, only recent wounds were found. As far as we can determine, this is the first specimen taken in the United States during January, and constitutes the second record for that month, Torrey (Condor, 11: 207, 1909) having seen one during January, 1908, at Coronado, California. This is the third published record of an American Golden Plover observed in Florida in winter. A. H. Howell ('Florida Bird Life,' p. 222) lists two specimens taken in winter by R. D. Hoyt, one in December, 1900, the other on November 19, 1901. Subspecific identification was made by Dr. H. C. Oberholser, and the specimen is now in the National Museum.—FRANCIS M. WESTON, U. S. Naval Air Station, Pensacola, Florida, and ROBERT C. McCLANAHAN, Bureau Biological Survey, Washington, D. C.

**Western Willet in Ohio.**—On September 12, 1936, the writer collected a Western Willet (*Catoptrophorus semipalmatus inornatus*) along the beach of Lake Erie at Ashtabula in extreme northeastern Ohio. The bird was an immature female and was in very poor condition, weighing only 271.9 grams. The bird, several weeks previous to collection, had broken its left leg an inch above the ankle joint. This had healed without juncture of the bone edges and at a 30-degree angle from the normal position, giving the bird a peculiar limp and making feeding difficult. Several dozen Mallophaga and several hundred mites (species undetermined) infested the body. The skin of this specimen (no. 7124) has been placed in the Ohio State Museum collections.

Dr. Kirtland (1840) considered this species a common visitor in spring and autumn, Dr. Landon and Dr. Dury recorded it as a rare spring and fall migrant in the Cincinnati region, and Dr. Wheaton (1879) had no records for central Ohio. All available data would indicate that this species a century ago was uncommon to rare in nearly all of Ohio except along the Lake Erie shore where it occurred locally and regularly in some numbers. The oldest Ohio specimen still in existence is probably an unpublished record furnished me by Mr. John W. Aldrich of a bird taken at Cleveland, August 20, 1868, and now in the Cleveland Museum of Natural History.

No additional published records are known previous to 1900. Though this species

is undoubtedly considerably reduced from its former numbers, extensive field work by the ornithologists of the State still produces a record every two or three years. My bibliography of Ohio ornithology indicates that there has been a total of seventeen published records for the State since 1900. These include 32 individuals seen in groups of from one to seven individuals each, from April 16 to May 29 and from August 10 to November 2.

Five specimens were taken along the Lake Erie shore as follows: Oak Point, Lorain County, September 17, 1906 (Lynds Jones); one at Bay Point, May 29, 1924, and one at Bay Ridge, September 7, 1925 (M. B. Trautman); one at Vermilion, September 14, 1931 (Emerson Kemsies); and one at Ashtabula on September 12, 1936 (L. E. Hicks). Only a single specimen has ever been taken in inland Ohio: five seen and one taken at Grand Reservoir, May 13, 1933 (Trautman and Hicks). There are five sight records from near the Lake Erie shore: April 30, at Oberlin and November 2 at Bay Point as recorded by A. C. Bent; August 12, 1917, at Painesville (E. A. Doolittle); seven on April 2, 1933, at Rye Beach (Emerson Kemsies); and one near Toledo on May 4, 1935 (Louis W. Campbell). Sight records from inland Ohio include: four at North Lima, Mahoning County on August 10 to 13, 1914 (J. P. Young); three at New Bremen, Shelby County, on August 30, 1915 (W. F. Henninger); one north of Dayton on April 16, 1924 (B. J. Blincoe); one at Pine Lake, Mahoning County, on September 28, 1930 (R. O. Marshall); one at Youngstown on September 15, 1933 (E. Minnech); and one September 10 to 18, 1924, near Columbus (M. B. Trautman).—LAWRENCE E. HICKS, *Ohio State University, Columbus, Ohio.*

**A second North American specimen of the Bar-tailed Godwit.**—On the afternoon of July 26, 1937, while we were looking over a large gathering of migrant shorebirds on the flats and marshes on the inside of Nauset Beach, Eastham, Cape Cod, Massachusetts, we noticed a large shorebird among the Dowitchers, Yellowlegs and Willets, that we for the moment assumed to be a Hudsonian Godwit. On closer approach, the bird took wing ahead of the rest of the flock and at that instant we realized that the bird was not a Hudsonian Godwit, since none of the characteristic field marks was visible. Fortunately we were able to find the bird again on some flats about half a mile away and this time a cautious approach behind cover brought us within gunshot and the bird was secured without delay. The specimen proves to be *Limosa lapponica lapponica* (Linnaeus), an adult female in good condition but one of those individuals that failed to moult into nuptial dress. Instead it wore a worn winter plumage, thickly shot through with fresh feathers of the corresponding plumage. In accordance with the custom generally observed among the ornithologists of eastern Massachusetts, we have presented the specimen to the Boston Society of Natural History in whose museum so many of the New England record specimens are gathered.

*Limosa lapponica lapponica* is a palaearctic form which breeds in northern Europe and northern Asia from Scandinavia to the Khatanga River; its inclusion in the fourth edition of the A. O. U. 'Check-list' is based on the following brief statement in Bent's 'Life Histories of North American Shore Birds,' part 1, page 295, 1927: "A specimen taken on Cape Cod, Massachusetts, on September 16, 1907, is referable to the European form—". Since no details relating to the capture or disposition of this specimen have ever been published, we give the following account with Mr. Bent's permission. The skin was originally no. 963 in collection of Charles R. Lamb of Cambridge; it is now no. 11017 in the Bent Collection. It is a characteristic female of the typical race of *Limosa lapponica*, in fresh fall plumage. Mr. Lamb's original

label bears the following interesting notation: "Purchased in the flesh Sep. 23, 1907, of H. L. Lawrence, 46 & 48 Faneuil Hall Market, Boston, Mass., who said this bird was shot on Cape Cod, Mass. & was received by them Sep. 17, 1907. The bird was exposed for sale with other No. American shorebirds, no European, all same condition, rather old." Thus the first North American record for *L. l. lapponica* is based on a market specimen with the incomplete data usual in such cases, though we do not feel any real doubt that the bird actually was wild-killed somewhere along the New England coast, though not necessarily on Cape Cod.—JAMES L. PETERS, *Museum of Comparative Zoology, Cambridge, Mass.*, and JOSEPH A. HAGAR, *20 Somerset St., Boston, Mass.*

**Avocet taken in Ohio.**—On September 21, 1936, the writer collected an Avocet (*Recurvirostra americana*) along the beach of Lake Erie at Ashtabula in extreme northeastern Ohio. The bird was an immature male, weighed 274.7 grams and was in fair condition though covered with a light oily scum from harbor waters. The skin has been donated to the Ohio State Museum Collection (no. 7123). This seems to be the first specimen of the Avocet taken in Ohio since 1882. The species was first recorded for the State by Dr. Kirtland in 1837, on the basis of reports to him that it had been killed by sportsmen in the vicinity of Cincinnati. This report was repeated by Landon and Jones, and by Charles Dury who added that the bird had been reported on sand bars along the Ohio River. However, the only Avocet specimen ever contained in the Cuvier Club collection at Cincinnati was one (no. 374) which actually came from either Calumet Lake, Indiana, or Calumet River, Illinois (Butler, A. W., *Proc. Indiana Acad. Sci.*, **36**: 341-344 (1926) 1927). Hence, no specimens are known to have been taken in the Cincinnati region and it seems highly probable that any sight records for the region which may have been reliable, were not actually from the State of Ohio.

Dr. Jones records a rumor of a Mr. A. Hall having observed a specimen from near Cleveland but there is no basis for accepting it. The only definite sight records known previous to 1936 are three recorded by A. C. Bent in his 'Life Histories of North American Shore Birds,' 1927. He lists Avocets November 4, 1907, and March 16 to 21, 1907, at Oberlin, Ohio; and May 24, 1914, at Sandusky, Ohio. There are only two known instances of Avocets taken in Ohio previous to 1936. These were: (1) a specimen taken by Mr. Clemens Utter at St. Mary's Reservoir on November 10, 1882, and reported by Dawson (1903) as being contained in the Ohio State University Collection and (2) a specimen taken in winter plumage at Lebanon Reservoir in the spring of 1880 by R. W. Smith and reported by Jones (1903) as being contained in Mr. Gould's collection. These specimens, if still in existence, are unknown to present-day ornithologists.

Recent eastern reports of Avocets in 'The Auk' include the following: Florida, January 1933; Iowa, spring 1934; North Carolina, December 1934; Illinois, October 1935; and Cape Cod, Massachusetts, September 1925. Drouth effects in the mid-west may have been responsible for some of these Avocets straying so far east. The species occurred in at least three localities on or near the Lake Erie shore in the summer of 1936, for in addition to the specimen recorded above at Ashtabula, Ohio, a second bird was discovered the same day (September 21, 1936) and observed for two hours at the entrance to the harbor at Erie, Pennsylvania. A third bird was not observed by the writer but was reported and well described by several persons living near Waterville along the Maumee River. This individual was present intermittently during the first three weeks of September 1936.—LAWRENCE E. HICKS, *Ohio State University, Columbus, Ohio.*

**Herring Gull at Barbados.**—On March 22, 1937, our steamer anchored in the harbor at Bridgetown in the early morning. After a forenoon ashore I returned to the ship at lunch time. For an hour during the afternoon I was intrigued at watching a ragged immature brown Herring Gull (*Larus argentatus*) flying about our ship and adjacent boats, picking up scraps of garbage in its utterly familiar manner. Presumably this individual must have followed some steamer far beyond the normal southern limits for the species, as according to Bond's 'Birds of the West Indies,' the Herring Gull is unrecorded from the Lesser Antilles.—LUDLOW GRISCOM, *Museum of Comparative Zoology, Cambridge, Mass.*

**Saw-whet Owl in Lexington, Virginia.**—On February 22, 1937, while crossing the Washington and Lee campus, Lexington, Virginia, my attention was arrested by a low quavering sound coming from a tree near the walk. I stopped at once to investigate the noise and I saw perched on a limb, near the trunk of the tree, a very small owl. The first thing I noticed was that it was much smaller than the Screech Owl and that it had no ear tufts. I secured a large flashlight and studied this little owl for some time. The sound can be best described by likening it to that produced by blowing quaveringly across the mouth of a bottle. As the owl flew from tree to tree I could see clearly the facial discs with the radiating lines from the eye. The head was large, wings long and the tail short with white spots in rows. The general color was ruddy and the large amount of whitish tone gave it a rather silvery appearance in the moonlight. The markings were more streaks than spots.

Reference to several standard books leads me to the conclusion that this was an Acadian or Saw-whet Owl (*Cryptoglaux acadica acadica*). This species was recorded at Blacksburg in 1912 (Smyth) and again at Charlottesville in 1936.—J. SOUTHGATE Y. HOYT, *Washington and Lee Univ., Lexington, Va.*

**Northern Pileated Woodpecker in Hamilton County, Ohio.**—The late Dr. Frank W. Langdon ('A revised list of Cincinnati birds,' *Journ. Cincinnati Soc. Nat. Hist.*, Jan., 1879) in listing the birds of Cincinnati in December, 1878, wrote of the Pileated Woodpecker (*Ceophloeus pileatus abieticola*): "A former resident. Not recently observed"; farther along in the pages of the same paper in a summary of ornithological changes in the then recent days, he says: "—and our two largest Woodpeckers (*Campephilus principalis* and *Hylotomus pileatus*) have disappeared along with the dense forests that were their favorite resorts."

My pleasure, therefore, in being able to report the recent occurrence of one of these great woodpeckers from southwestern Ohio may well be understood. On February 7, 1937, I drove four and one-half miles north of Cincinnati to the Federal Rehousing Project of Greenhills in Hamilton County, Ohio, where I intended to make a count of the nests in a Black-crowned Night Heron colony in a small beech woods on the east side of Winton Road which was included in the resettlement area. Hardly had I stepped from my car when I heard a Pileated Woodpecker calling from well within the woods. The calling came so suddenly and was so brief, I felt that I must have been wrong about its identity since it was not repeated again although I waited some fifteen minutes for a repetition. Finally deciding that I must have been misled by a Flicker's call, and more or less forgetting the incident, I walked back into the woodland, counted the heron nests, and returned to my car. Just as I was about to unlock the door the same call came again. This time there was no mistaking its identity or the spot from whence it came. I hurried back across the road and had just re-entered the woods when the Pileated Woodpecker called again and at the same time hitched itself around on my side of a beech stub not forty feet away.

With the aid of my binocular I could plainly see the scarlet stripe at the base of the lower mandibles, denoting a male bird. It hammered about on the stub for three or four minutes and then flew farther into the woods. I slowly walked after it, but could never again approach within less than one hundred feet of the tree it was in. Finally it flew westward out of the woods and out of my sight.—KARL H. MASLOWSKI, *Cincinnati Society of Natural History Museum, Cincinnati, Ohio.*

**Status of *Mitrephanes phaeocercus pallidus*.**—While examining certain flycatchers in the collection of the Academy of Natural Sciences of Philadelphia, my attention was drawn to the similarity between *Empidonax fulvifrons fusciceps* Nelson, and *Mitrephanes phaeocercus pallidus* Carriker and de Schauensee (Proc. Acad. Nat. Sci. Philadelphia, vol. 87, p. 435, 1935). On closer examination the latter proves synonymous with the former.—RODOLPHE M. DE SCHAUENSEE, *Academy of Natural Sciences, Philadelphia, Penna.*

**American Magpie taken near Toledo, Ohio.**—On May 9, 1937, while checking up on new bird arrivals in Jerusalem Township, Lucas County, Ohio, I met Mr. and Mrs. Fred Stearns and Mrs. H. C. Mitchell of Toledo, who informed me that they had just seen a magpie. After some searching, I found the bird feeding along the shore of Lake Erie and collected it. It proved to be a female American Magpie (*Pica pica hudsonia*) in good condition but with the primaries and tail feathers badly worn. The bird weighed 180.5 grams and the ovary measured 11 x 6.3 mm. As far as I can determine, this is the first specimen of this species ever taken in Ohio. The skin has been given to Ohio State Museum.—LOUIS W. CAMPBELL, *Toledo, Ohio.*

**Southern Winter Wren in Virginia.**—Though the Winter Wren is recorded in the fourth edition of the A. O. U. Check-list as breeding south in the mountains to Georgia, little has been published of its occurrence in summer in Virginia. Dr. W. C. Rives (Auk, vol. 6, p. 52, 1889) thought than an unidentified song heard during the latter part of July, 1888, near the summit of White Top Mountain was possibly this species. He did not succeed in seeing the bird, however, so that the record remains uncertain. In his 'Catalogue of the Birds of the Virginias' (Proc. Newport Nat. Hist. Soc., doc. 7, p. 89, 1890) he writes of this species that "it is probably to be found also in summer near the tops of the highest Virginia Mountains." Harold H. Bailey ('Birds of Virginia,' p. 331, 1913) says "they breed in Giles, Grayson and Washington Counties; probably others in Alleghanian Range."

In our work on White Top Mountain, Virginia, in June, 1936, we made search for Winter Wrens without finding them, and concluded finally that if present, they were rare and local since the woods of this mountain on the whole are too dry to offer them an agreeable habitat. Further search for these birds was one of the objectives of our visit during the first days of June, 1937, to Mt. Rogers, adjacent to White Top in Grayson County, Virginia. In our first search through the heavy woods over the summit of the mountain we failed to find Winter Wrens but on June 3 were more fortunate. Almost immediately on entering the woods we heard the low, sweet-toned, somewhat uncertainly phrased notes of the song of this species coming from dense tangles of fallen trees overgrown with brambles where the birds kept entirely concealed though often only a few feet away from us. After a careful stalk of over an hour we collected one specimen, a male. Search in the U. S. National Museum has revealed two more specimens secured on the summit of Mt. Rogers by Harvey Davis on July 7, 1903, during work for John W. Daniel, Jr., and presented to the Museum by the latter. These were two females, one adult, and the other a

bird in juvenal plumage recently from the nest. On comparison of specimens it develops that the three skins from Mt. Rogers are the recently described Southern Winter Wren, *Nannus hiemalis pullus* Burleigh (Proc. Biol. Soc. Washington, vol. 48, p. 61, May 3, 1935; Mount Mitchell, 6500 feet, North Carolina). This is an extension of the known range of this race and its first definite report for the State of Virginia. It is of interest to record that the juvenal bird is duller and darker in color above and below than skins of similar age of the northern race, *Nannus hiemalis hiemalis*, from Rothesay, New Brunswick, St. Regis Lake in the Adirondacks, and Plateau Mountain in the Catskills of New York.—ALEXANDER WETMORE, U. S. National Museum, Washington, D. C., and J. J. MURRAY, Lexington, Virginia.

**Bohemian Waxwing in Luce County, Michigan.**—In spring, 1924, I planted some mountain-ash trees at various places in the yard where I reside, for the purpose of attracting birds. Of these, three are now living, and the berries have brought some interesting observations. Of the birds that I have seen coming for the mountain-ash berries, the Bohemian Waxwing (*Bombycilla garrula pallidiceps*) is of interest. I first saw this species on December 14, 1928, when a flock of ten was feeding on mountain-ash berries in the yard. The supply that season was small, and the birds nearly cleaned up that season's crop. I next saw Bohemian Waxwings on November 18, 1930, when a flock of four was feeding on the berries. Of the '1930' crop, there were nineteen clusters of berries on these trees in the yard; and on November 21, the fourth day of feeding, these four Bohemian Waxwings had finished the fruit here, and moved to a neighbor's home, where is a mountain-ash tree with a good supply of berries. During their stay at my home on the four days, they spent some of the 'resting' time on telephone wires and nearby trees, and at other times went to the woodlands within forty rods to the northeast. The largest number of mountain-ash berries that I saw a Bohemian Waxwing take at one meal was thirty. This flock of four was reduced to two on November 23 which marked my last record for the year 1930.

On March 23, 1931, a flock of three was seen in the orchard here feeding on frozen apples. On March 24 and 25 only two were seen, but on the 26th a flock of nine came to the orchard for frozen apples. In an effort to trap and band some of these birds, I got some mountain-ash berries which I had saved, and placed a trap with some berries in it, on the snow beneath the apple trees. I got only a single bird, which I gave band no. B117255. This was on March 26, which is also my last date for the Bohemian Waxwing that season. While being handled, this bird ejected nine mountain-ash berries. It is the only one of this species that I have banded.

On November 9 and 10, 1931, eight Cedar Waxwings (*Bombycilla cedrorum*) were seen feeding on mountain-ash berries in the yard. The first Bohemian Waxwing was noted on November 12 of that season—1931-32, when three were seen. Only one was seen on the 13th; but on the 14th the flock increased to 16, then to 31 on the 15th when they again cleaned up the season's crop of mountain-ash berries from the trees in the yard. My next record came with a flock of 19 on November 22, 1931, as they passed over the orchard. I next found Bohemian Waxwings on December 14, 1931, at a point three-fourths of a mile south. On this date eight were seen feeding on berries of black alder by the east side of McCormick Lake. Fourteen were seen at this location on December 18 and again, feeding on the same kind of berries, at the southwest corner of the lake shore, a distance of about 80 rods from where they were noted on the last two days. The berries were all consumed where they were noticed on those days.

Since the year 1931, I have secured only two records of the Bohemian Waxwing.

These are: March 20, 1933, two came to the mountain-ash trees in the yard, but found only skins of berries. Some Eastern Purple Finches (*Carpodacus purpureus*) had taken most of the 1932 crop and also what I had saved for use in trapping for banding operations. The last record is November 24, 1936, two at the mountain-ash trees, but again too late, as a flock of Cedar Waxwings which remained late, and some European Starlings (*Sturnus vulgaris*) had cleaned up the 1936 crop, and they refused even to go to the traps nearby for a taste of the berries.—OSCAR MCKINLEY BRYENS, R. F. D. No. 1, McMillan, Luce County, Michigan.

**North-south versus northeast-southwest migration of the Starling.**—Kalmbach (Wilson Bull., 44: 67, 1932) has published a map of returns from Starlings (*Sturnus vulgaris*) banded at Washington, D. C., in the winters of 1927–28 and 1928–29, showing a northward migration of banded winter birds from Washington, some actually to the eastern end of Lake Erie and the St. Lawrence. Such data are at variance with the hypothesis of two more or less separate northeast-southwest migration axes, one near the Atlantic coast and a second in the Great Lakes Basin. They presumably do not invalidate that hypothesis, however, but show another factor, probably of considerable importance, in the complicated migrational and distributional movements of the bird. Though with an inherited northeast-southwest direction which has accounted for much of its distribution, the Starling presumably moves directly south into new territory under pressure of winter, some birds at least returning north to the same breeding area the following spring, whereas the extension of its range directly north into new territory is a slow matter. Even so, with Washington in the bird's primary Connecticut-New Jersey, northeast-southwest axis of distribution (Auk, 54: 210, 1937), the paucity of returns to the northeast on this map requires explanation. The high and steadily increasing concentration of wintering Starlings in New Jersey very likely absorbs migrants from the northeast along this axis, so that those found wintering in Washington were for the most part local or derived from other sources.

The appearance in the 'Bird-Lore' Christmas census in 1926 of wintering Starlings near the lower part of the Penobscot Valley in Maine, and their regular occurrence in the State in succeeding censuses, may be taken as evidence of another case where the bird was driven south into new territory by winter. In a trip through northern New England by road in the summer of 1936, I found the Starling near Houlton, Maine, and in adjacent New Brunswick, and more plentiful in Quebec north of the Vermont line, but missed it in the coastal region from the Massachusetts line to Bangor. It seems more probable that such Maine-New Brunswick birds reached these summer quarters following the Great Lakes axis north of Vermont and New Hampshire, than that they crossed the wide stretch of coastal Maine where they must still be uncommon to have been missed, in an extension of the New Jersey-Massachusetts axis. Such being the case they might reasonably be supposed to have reached coastal Maine as winter visitants from the north down the Penobscot Valley.—JOHN T. NICHOLS, New York, N. Y.

**A Pine Warbler killed by arsenical spray.**—On June 22, 1937, Earl Whitcomb picked up, under a large pine tree, at Beverly Farms, Massachusetts, a Northern Pine Warbler (*Dendroica pinus pinus*) in fine adult plumage. On careful examination the bird showed no evidence whatever of external damage.

As I have long suspected that there was a mortality among insectivorous birds owing to the practice of spraying vegetation with arsenate of lead, and as I surmised that eating insects which had been sprayed or which had fed on sprayed foliage

might possibly be the cause of this bird's death, I brought the bird to Cambridge and enlisted the interests of my colleague, Dr. Jeffries Wyman, Jr., who, in turn, persuaded Dr. A. J. Haagen-Smit and Dr. George Hass to make a careful chemical analysis, first, of the liver and kidneys of the bird and, secondly, of the other remaining tissues. General diffusion of arsenic throughout the whole body would possibly have been inconclusive as representing either high tolerance or chronic poisoning; but the finding of most of the arsenic in the liver and kidneys is good evidence that we have here the cause of its death.

Doctors Haagen-Smit and Hass's report follows, published here by their kind permission:—

"An examination of the viscera of the bird revealed nothing of importance. They were intact. The liver and kidneys were carefully dissected away from the neighboring structures and were removed without contamination by intestinal contents. The total amount of hepatic and renal tissue weighed approximately 500 mgm. The bird was then divided into two parts for determination of the content of arsenic.

"The liver and kidneys were placed in a 50 cc. distilling flask; 25 cc. of concentrated hydrochloric acid (Merck) with less than 0.00001% of arsenic were added. The digestion was almost complete in 24 hours. The distilling flask was then connected to a condenser. The receiving flask contained a few cc. of distilled water. The distillation was continued almost to dryness. Then a second quantity of 25 cc. of concentrated hydrochloric acid was added to the residue. Three hours later this fluid was distilled off into a receiving flask. The two fractions of distillate were united.

"The procedure for digestion of the remainder of the bird was the same. About 125 cc. of hydrochloric acid were required to carry the digestion to completeness, only a small amount of residue remaining in the flask.

"The arsenic content was determined by the Marsh-Gerzeline method, as described in 'Legal Medicine and Toxicology' (Peterson, Haines & Webster, vol. 2, 1923).

"The liver and kidneys contained 0.51 mgm. of arsenic. The remainder of the bird contained 0.003 mgm. of arsenic."

(Signed) A. J. HAAGEN-SMIT  
GEORGE HASS

It is greatly to be hoped that similar analyses may be made from time to time, and Dr. Hass has indicated his willingness to repeat the examinations should opportunity offer. Birds sent to the undersigned will be welcome if accompanied by definite information concerning the circumstances under which the dead specimens were found.—THOMAS BARBOUR, *Museum of Comparative Zoology, Cambridge, Mass.*

**Palm Warbler in Bermuda.**—On March 15, 1937, I found a Palm Warbler, typical *Dendroica palmarum*, on the golf-club grounds at St. George's. It was very tame, allowed a close approach, and was under excellent observation with a Zeiss binocular for several minutes. The subspecies was positively determined by the entire absence of yellow on the under parts except for the vent and under tail coverts, which were in sharp contrast with the dirty brownish white of throat, breast and belly. Oddly enough this race is unrecorded from Bermuda, a curious lacuna, which the late Warren F. Eaton predicted would be filled at almost any moment (cf. Bradlee, Mowbray and Eaton, 'List of Birds recorded from the Bermudas,' Proc. Boston Soc. Nat. Hist., vol. 39, p. 364, 1931). As is now well known, the 'Western' Palm Warbler in winter plumage is easily distinguishable in life from the Yellow

Palm Warbler.—LUDLOW GRISCOM, *Museum of Comparative Zoology, Cambridge, Mass.*

**Cowbird's egg in a Red-wing's nest.**—In view of the general paucity of records of the Red-wing being victimized by the Cowbird in eastern North America, perhaps my experience on June 5 of the present summer (1937) may be of interest. On this date I found a nest of the Eastern Red-wing (*Agelaius phoeniceus*) containing four eggs of the owner, and one heavily zoned egg of the Cowbird (*Molothrus ater ater*). When found the nest had been deserted by the owner, whose eggs were slightly incubated, while that of the Cowbird was perfectly fresh. On a conservative estimate during the past twenty-five years I must have examined some 500 nests of the Red-wing, and my friend, Mr. L. M. Terrill, probably three times that number without finding a case of parasitism by the Cowbird, thus showing how rare the event is in these parts. At the moment I know of no published record for Canada, and in a recent letter from Dr. Herbert Friedmann he tells me that since the publication of his monograph on the Cowbird in 1929, he has only received one or two records for the eastern United States. As he points out, however, in his monograph, the event is of somewhat common occurrence in the Middle West, but extremely rare in the eastern United States, a remark that would seem to apply equally well to eastern, if not to the whole of Canada.—HENRY MOUSLEY, 4073 Tupper Street, Montreal, Canada.

**European Goldfinch at Hanover, New Hampshire.**—On the morning of May 13, 1937, at 8 a. m., while standing at the window watching the Goldfinches (*Spinus tristis*) swinging on the pendant twigs of a larch tree (*Larix europæa*), I noticed a European Goldfinch (*Carduelis carduelis* subsp.) swinging on a twig. Its bright-red mask was plainly visible, as well as the circle of black on its head, and the cinnamon-brown of its back. It was swinging and feeding like the other Goldfinches, looked a little larger than they, and was nearly upsidedown when I first saw it. Its appearance was most striking in the pale new yellow-green of the larch tree. It flew away with the little flock of American Goldfinches, but at 9.40 a mixed flock of American Goldfinches and Pine Siskins (*Spinus pinus*) flew into the larches, and some dropped to the ground, to drink from the little pool by the brush-pile, and to search for weed seeds there. In the group of birds on the ground we saw the European Goldfinch. It came into plain view and was seen distinctly by Mrs. Haskins and Dr. Frederic Lord (Dr. Lord knows the Goldfinch in Europe and identified it immediately). It flew to the third larch, displaying the broad yellow band on its black wings.

At 10.20 a. m. while Mrs. Forsyth was here, we had our last glimpse of the goldfinch. It flew almost to the top of the oak tree facing the north window, then disappeared around the side of the house, and was gone.

As far as we knew at the time this was the only record of the European Goldfinch in New Hampshire. Forbush in 'Birds of Massachusetts and Other New England States' does not mention *Carduelis carduelis*. A week or so later, however, I told the Scotch hairdresser, Donald Miller, of having seen the European Goldfinch. Mr. Miller has been a bird-fancier and has raised "caged" birds, and hailing from the British Isles, knows the European Goldfinch well. He said that five years ago he had seen three "English Goldfinches in a little bush at the Stadium" here, and that he had wanted to cage them. He has seen one, or more, several times since, but none this year nor last year. He did not know that they were not indigenous to this country, so their appearance had not surprised him.

In 'Birds of New York' (vol. 2, 1914), Eaton says of the European Goldfinch: "This old world species was introduced at Hoboken, N. J., in 1878. The following year it appeared in Central Park, New York City, and soon spread over the northern portions of Manhattan island and the surrounding country. Locally not an uncommon resident (Adney, Auk, 3: 409). The winter of 1889, Mr. Hendrickson reported three specimens from Long Island City. In the winter of 1891 many were noticed flocking with the American goldfinches at Dobbs Ferry, but several were found dead in the snow, evidently the severity of the winter proving too much for this species (Dr. A. K. Fisher).

"I am not aware that the European Goldfinch has increased, or even held its own in this State since the brief records rehearsed above were published. In the spring of 1900 I noticed several pairs that were endeavoring to build their nests in Central Park, and in the country about Kings Bridge and Spuyten Duyvil, New York City; but from all reports it seems that this beautiful species is not likely to become established so easily as the obnoxious European sparrow."

In the leaflet published by the American Museum of Natural History, in 1925, 'Bird Hunting in Central Park,' by Ludlow Griscom, the European Goldfinch is not mentioned, even in the 'rare-bird list.' So the goldfinches did not get established in Central Park. When in Bermuda in March, 1932, I saw several of the goldfinches there.—DORIS HUESTIS MILLS, *Hanover, New Hampshire*.

**An Ohio invasion of Leconte's Sparrows.**—During early September, 1936, the writer received field reports from Louis W. Campbell of Toledo, which indicated that an unusual migration of Leconte's Sparrows (*Passerherbulus caudacutus*) through Ohio was in progress. This species was unknown to Ohio previous to 1936 except for an adult male specimen taken April 5, 1880, by Mr. Charles Dury in a swampy meadow at Ross Lake, Hamilton County, near Cincinnati (L. Jones, *Wilson Bulletin*, 19: 20, 1907) and a sight record on September 3, 1932, near Toledo, Ohio, by John H. Ritter (*Wilson Bulletin*, 45: 29, 1933). Accordingly, the writer spent most of the time available over weekends from September to December 1936, checking on this invasion in different parts of the State.

Enough evidence was obtained to indicate that at least several hundred Leconte's Sparrows passed through the State. The birds, where found, were usually in compact little groups of from two to thirty-five birds each and definitely confined to certain ecological habitat conditions, apparently in only a few widely scattered stations. Hence it is not surprising that they were missed by most observers. The only known Ohio records for 1936, in addition to those listed below, were obtained by Louis W. Campbell and others in the Toledo region and by Karl Maslowski, Woodrow Goodpaster and others in the Cincinnati region. The first 1936 record for the State was a specimen taken by Campbell along the Maumee River above Toledo on August 30, and the last one was taken by the writer north of Buckeye Lake on November 23, 1936.

The writer succeeded in recording the species on eight dates from October 17 to November 23, 1936, in seven localities of five counties of northwestern and central Ohio. In all, 54 birds were seen, of which nine specimens were taken, representing seven localities in five counties. Of the specimens, two are now in the Cleveland Museum of Natural History collections, three in the Ohio State Museum collection, one was destroyed and three are in the writer's Fringillidae collection. The six females ranged from 11.4 to 14.0 grams and averaged 12.3 grams. The three males ranged from 13.1 to 14.1 grams and averaged 13.7 grams. All had completed their moult and were in excellent plumage and good body condition. The skulls seemed to indicate that all were immatures.

Specimens observed and taken were as follows: October 17, in a marsh in Jerusalem Township, Lucas County, Ohio, 35 seen, two males and a female collected, all in blue-joint-grass marsh (*Calamagrostis canadensis*); October 31, a mile east of Worthington, Franklin County, six seen and a male and a female collected in an old weedy red-clover meadow; November 7, two birds seen in the same meadow; November 10, a mile east of Westerville, Franklin County, two birds seen and a female collected in a swampy area covered with sedges and common rush (*Juncus effusus*); November 12, 1936, two birds seen and a female collected among driftwood trash at shoreline of O'Shaughnessy Reservoir, near Rathbone, Delaware County; November 17, Liberty Township, Wood County, three seen and one female collected in an old weedy alfalfa field; November 22, two miles southeast of Utica, Licking County, three birds seen feeding on seeds washed up with drift at water's edge along the margins of a peat bog; November 23, a mile northeast of Hebron and just north of Buckeye Lake, one female collected in swamp of sedges (*Carex* and *Cyperus*).

Probably none of the Leconte's Sparrows seen was in actual migration at the time as repeated visits were usually rewarded by the finding of birds each time in the same field. Some individuals appeared to have selected a definite territory and refused to range beyond definite limits. The species is known to have been present in a limited area of Little Cedar Point Marsh for a period exceeding six weeks.

That this invasion was not confined to Ohio is indicated by records obtained by Dr. J. Van Tyne and others in southern Michigan, the observation of birds at Lebanon, Missouri, by G. E. Moore until November 8, 1936 (Bird-Lore, 39: 172, 1937), the collection of a specimen on February 20, 1937, at Lakeview, Mississippi (Ben B. Coffey, The Migrant, p. 15, March 1937), and the taking of a bird by Dr. George M. Sutton at Beech Bottom near Bethany, West Virginia, on September 19, 1937 (one also seen on September 8) (The Redstart, 4: 118, Jan. 1937).

The late fall dates in Ohio, the record of February 20, 1937, near Memphis, Tennessee, and the further collection of the species in March 1937, near Cincinnati (K. Maslowski and W. Goodpaster), indicate that birds participating in the invasion may not have reached their normal winter range and may have succeeded in wintering from southern Ohio southward.—LAWRENCE E. HICKS, *Ohio State University, Columbus, Ohio*.

**Lapland Longspurs in Wisconsin in summer.**—On July 17, 1937, I visited a shallow lake near Madison, Wisconsin, which was in the process of drying up and on which there was a remarkable concentration of shorebirds, numbering several thousand. On and about what had once been the shore, but which now was a partially dried mud flat, I was amazed at seeing a flock of 30 or 40 Lapland Longspurs (*Calcarius lapponicus lapponicus*). They were under observation for a quarter of an hour, sometimes standing or walking within twenty feet of me, so near that it was not necessary to use my binocular. In fact, if I had held them in my hand, as I have often done, I could not have been more certain of their identity. I believe the latest spring date for them here is May 5, and the earliest fall record September 25, which was very exceptional.—JOHN S. MAIN, *Madison, Wisconsin*.

**Records from the Isles of Shoals.**—During the summers of 1935 and 1936 while doing thesis work at the Isles of Shoals under the direction of Professor C. F. Jackson of the University of New Hampshire, I collected three specimens of particular interest. The islands lie about ten miles off the coast of Maine and New Hampshire, and since the state line runs between the islands both Maine and New Hampshire records are included. Mr. Arthur H. Norton, of the Portland Society of Natural History, has very kindly furnished the available Maine records.

**PURPLE SANDPIPER, *Arquatella maritima*.**—One was taken on Appledore Island, Maine, on August 15, 1935, and another on Londoner's Island, New Hampshire, on July 14, 1936. There are three previous Maine summer records, but there have been none since 1907. There are, I believe, no previous New Hampshire summer records.

**EASTERN LARK SPARROW, *Chondestes grammacus grammacus*.**—A pair appeared on Appledore Island, Maine, on August 20, 1936, and one, a female, was taken. There have been several previous sight records and a banding record, but this is the first record based on a collected specimen.—PHILIP L. WRIGHT, *Department of Zoology, University of Wisconsin, Madison, Wisconsin.*

**Notes from Vermont.**—**GANNET, *Moris bassana*.**—W. P. Smith's recent list of Vermont Birds (Bull. 41, Department of Agriculture, Montpelier, Vt.) discreetly omits any reference to the Gannet, although an unquestionable specimen of this form has for years been used as mantel piece in one of the rooms of the State Office Building. No data of any kind were preserved with the specimen. However, a letter of inquiry to H. P. Sheldon, Commissioner of Fish and Game during the period when the bird was said to have been taken, now confirms the belief that the Gannet was taken in Vermont. Despite the fact that the actual place and date of capture,—known to be somewhere in the Connecticut River valley in 1920 or 1921,—are still rather vague, it nevertheless seems justifiable to add this rare and accidental straggler to the State list. It is an immature bird in first-winter plumage.

**AMERICAN EGRET, *Casmerodius albus egretta*.**—Although the occurrence of this species in the State has apparently never been substantiated by an actual specimen, its presence on Lake Champlain during recent summers has been reported by so many competent observers that there seems little reason to doubt its occurrence. As many as eight of these large white egrets have been seen at one time, though the more usual observation has been from two to five. Reports of them have come to the Conservation Department from two State wardens, two members of the Biological Survey, lakeside residents and summer visitors. Those recorded by members of the Survey were at Missisquoi Bay, at the northern or Canadian end of the lake; the others were at West Haven and vicinity at the southern extremity. Most of the reports relate to late-summer observations, the post-breeding season which so frequently witnesses the northward exodus of many Ardeidae from more southern breeding grounds; but one observation of four adults in June at least hints at the possibility of their breeding somewhere on the Lake.

**GOLDEN EAGLE, *Aquila chrysaetos canadensis*.**—Though extra-limital records of this erratic eagle are no longer a matter of great surprise, it is always of interest to report its occurrence. A specimen of this western form came to grief by electrocution at Bennington, Vermont, December 15, 1936, when a trapped victim made away with a trap whose dangling chain snared the eagle among high-tension wires. John Tracy Adams, the linesman who finally retrieved the dead bird from the wires, has the noble specimen mounted without any data at his home in Bennington. The owner of the trap has not been identified. It seems advisable to record these data before they are entirely lost. The eagle's tarsi were fully feathered down to the toes.

Bennington seems to have been a Waterloo for Golden Eagles, as four previous examples of this species are said to have been taken there. One was captured two years ago when it failed to make a safe retreat with a Domestic Goose into which it had buried its talons. Before the eagle could rise or disengage its claws, the farmer pounced on it. For some time the bird was retained and cared for at the State Game Farm, but was finally liberated.

**BLACK GYRFALCON, *Falco rusticolus obsoletus*.**—A specimen of this rare and interesting hawk was taken at the State Game Farm in Milton, Vermont, January 30, 1937, and is now a study skin in the modest collection of the Fish and Game Service at Montpelier. It proved to be a female with a moderately developed ovary. Except for several down feathers of some passerine bird, the stomach was empty. The present rather unsatisfactory knowledge of the taxonomic status of the gyrfalcons makes the subspecific determination of this form a little uncertain, but it seems best to consider it as the gray phase of the Black or Labrador Gyrfalcon. There do not appear to be any other records of this form or allied races in the State. Paucity of records for other States likewise indicates that the gyrfalcons only rarely visit the United States.—GEORGE J. WALLACE, *Biologist, Vermont Fish and Game Service, Montpelier, Vt.*

**Summer records from Ocean County, New Jersey.**—The following observations were made by the writer in Ocean County, New Jersey, during the summer of 1936.

**COMMON LOON, *Gavia immer immer*.**—An individual of this species in young or winter plumage, was observed on Barnegat Bay, just south of Mantoloking on August 11, 1936, and another in flightless condition was seen by Charles H. Rogers and the writer on Barnegat Bay, just north of Barnegat Inlet, on August 15, 1936.

**DOUBLE-CRESTED CORMORANT, *Phalacrocorax auritus auritus*.**—A flock of thirty of these birds, most of them with light underparts, was seen from July 2 into September, just south of Mantoloking. The birds were observed on and around the fish pounds in the ocean, as well as on Barnegat Bay, and roosted on a small mud islet in the bay.

**MYRTLE WARBLER, *Dendroica coronata*.**—A Myrtle Warbler in brown plumage was seen at Lake Metedeconk, west of Point Pleasant, on July 23, 1936.—ROBERT W. STORER, *South Orange, New Jersey.*

**Uncommon winter birds in coastal North Carolina.**—During the last week of January, from the 24th to the 31st, the writers were engaged in field work in coastal North Carolina, from Currituck to Cape Hatteras. A number of migrant birds were encountered whose presence there seems sufficiently unusual to warrant a brief report.

Pea and Bodie Islands have long been known to be the wintering grounds of a small flock of Greater Snow Geese (*Chen hyperborea atlantica*). At least, during the past five years, their numbers have increased from approximately a thousand to fully four times that number during the present season. From counts made, it appears that from 15% to 20% of their present number are birds of immature plumage. For the past three years a small number of Blue Geese (*Chen caerulescens*) have been seen in company with the Snow Geese. Ten of the latter species were observed at Bodie Island as two small units of the larger aggregation. It was interesting to note that while the Blue Geese associated with the Snow Geese, they habitually remained as small units of the larger flock.

On the impounded freshwater pond near Bodie Island Light House, on January 25, we were surprised to find one male European Widgeon (*Mareca penelope*) in company with a flock of some thirty-five Baldpates. The bird was observed at about 100 yards through a good pair of field-glasses and stood in marked contrast to its American relatives. While records of this European wanderer in North Carolina are of interest, Pearson, Brimley, and Brimley ('Birds of North Carolina,' No. Carolina Geol. and Economic Surv., 4: 63-64, 1919) mention two specimens that were

taken on Currituck Sound. One was collected in 1887, and the other in November 1900.

A limited number of Black-bellied Plover (*Squatarola squatarola*), Red-backed Sandpipers (*Pelidna alpina sakhalina*), Sanderlings (*Crocethia alba*), and Great Black-backed Gulls (*Larus marinus*) have been encountered in this same area each winter for at least the last six years. All were seen by each of the three observers at a number of places on the North Carolina coast during this visit.

Of greater interest is the occurrence of a large number of Dovekies (*Alle alle*) and a limited number of Razor-billed Auks (*Alca torda*) at several places along the coast from Bodie Island to Cape Hatteras. The Dovekies, in particular, were seen in large concentrations at Oregon Inlet from the middle of December to about the middle of January. A number of persons, including Superintendent Walker of the Pea Island Refuge and Captain John A. Midgett of the Chicamacomico Coast Guard Station, reported seeing flocks containing more than a thousand of these pelagic birds. Superintendent Walker informed us that he has seen a total of eighteen Razor-billed Auks. He collected and mounted specimens of both species. In addition to the mounted specimens, which were examined, the writers also found along the beach the bodies of two Dovekies and one Razor-billed Auk that had become oil-soaked. With the exception of the phenomenal wave of Dovekies that occurred along the entire Atlantic coast of the United States in November, 1934, this is the only marked intrusion and concentration of these birds that has ever been reported in North Carolina. Only a few occurrences even of individuals of either species have ever been recorded for North Carolina. Whether some unusual ocean current brought these birds to the Carolina coast is not known.

Pearson, Brimley, and Brimley in their account of the birds of the State (in 1919) give two records of the occurrence of the Snow Bunting (*Plectrophenax nivalis nivalis*) in North Carolina. One was at Pea Island, Dare County, in February, 1901, and the other at Oriental, North Carolina, on January 26, 1918. On January 25, 1937, the writers observed two rather large flocks of these birds, totalling perhaps 150 individuals, on the sandy barrier beach at Kittyhawk. One male and a female were collected and their skins added to the Biological Survey collection.—CLARENCE COTTAM, A. L. NELSON, AND C. S. WILLIAMS, *U. S. Biological Survey, Washington, D. C.*

## RECENT LITERATURE

**Peters's 'Check-list of Birds of the World.'**—The publication of volume 3 of Peters's Check-list is the event of the year for the bird taxonomist and museum curator. I can say without exaggeration that during the past years I have used Peters's first two volumes more than any other ornithological publication, and that I have always found it reliable. The third volume<sup>1</sup> contains the orders Columbiformes and Psittaciformes, with the sand-grouse, pigeons, and parrots. Only a few of these forms occur in North America, but still these groups are very important both from the point of view of the aviculturist and that of the student of tropical ornithology. The wide development of these orders in some parts of the tropics is best illustrated by figures: one-fifth (= 230) of the known forms of breeding birds in the New Guinea region (= 1327) are pigeons or parrots.

Compared with the corresponding volumes of the 'Cat. Birds' there are probably fewer additions of forms and other changes in this volume of the check-list than in most others, owing to Salvadori's truly admirable treatment of the pigeons and parrots in the 'Cat. Birds Brit. Mus.' The majority of the changes are due to the evolution of our ideas on taxonomy, which has resulted in the modern concept of species and genus. Sharpe (1909, Hand-list of Birds, vol. 5, Introduction, p. viii) lists 94 genera of Columbæ, Peters admits only 59, a reduction of 36%. Sharpe (l. c.) admits 650 species, Peters only 310, a reduction of 52%. Altogether Peters admits 843 forms of Columbæ, an increase of 30% over Sharpe's number. These figures on the pigeons agree closely with an analysis made by me of the first two volumes of the check-list (see Proc. Linn. Soc. New York, no. 45-46, p. 19-23, 1935).

Seven subspecies and one genus are renamed because no applicable names were available. The arrangement of the genera and families follows the conventional lines, but Mr. Peters has refrained from splitting the parrots into several families, and groups the lories, cockatoos, etc., as subfamilies. The flightless New Zealand parrot *Strigops*, is placed in a special subfamily at the beginning of the Psittacidae, although it is unquestionably a close relative of the Australian genera *Pezophorus* and *Geopsittacus*, which are placed at the very end of the Psittacidae. More anatomical studies are required before some of the genera, such as *Psittichus* and *Otidiphaps*, can be arranged in their proper systematic position.

Peters's volumes are in the hands of so many ornithologists that I almost hesitate to mention their principal features for the benefit of those who are not yet familiar with this work. It lists every valid species and subspecies, with the original quotation, the type locality, and such synonyms as were proposed since the publication of Sharpe's Hand-list. The detailed range of each form is given, as well as the winter quarters of the migratory forms, a veritable mine of information for the student of animal distribution. Under each genus some references are listed to recently published monographs or revisions. The author wisely refrains from the use of vernacular names. Most of the birds of the world, with the exception of the well-known North American and European species, have no generally accepted vernacular names and it would place a heavy burden on Mr. Peters to invent English names for them. Besides, this is an international check-list and it is the very purpose of scientific nomenclature to provide names which are understood by naturalists of all nations.

<sup>1</sup> James Lee Peters. Check-list of Birds of the World. Volume III. 8vo, Cambridge, Harvard University Press, xlii + 311 pp., 1937. Price \$3.50.

The amount of labor that goes into the preparation of such a check-list, can be estimated only by those who have attempted a similar task. Every ornithologist, be he in charge of a collection, or be he interested in the classification or distribution of birds, is deeply indebted to Mr. Peters for the painstaking exactness with which he has accumulated all this useful information. We congratulate him on the completion of this volume and look forward with anticipation toward the completion of the next one.—E. MAYR.

**Arthur's 'Audubon: an intimate life of the American Woodsman.'**—The number of volumes by, or about, Audubon, that have appeared in the last twenty years is quite amazing, and must be attributed to the curiosity which his adventurous and romantic life has aroused in the reading public, as well as to the engaging beauty and interest of his delineations of bird life. As a climax to this, all of his great bird plates are now being reproduced in full color, but in reduced form, and accompanied with an appropriate text. Doubtless this legitimate curiosity about the life and accomplishments of so singular a genius has been whetted somewhat by the fantastic theory that Jean Jacques Fougère Audubon was the real lost Dauphin, son of Louis XVI and Marie Antoinette, in name the veritable King Louis XVII of France.

Mr. Arthur, in his recent biography,<sup>1</sup> has given, I think, a very true picture of Audubon the man, and his account is detailed, accurate and very interesting. He portrays Audubon as quite human, with plenty of faults, which cannot always be excused, but with versatile powers that few could match. He shows also that dogged perseverance in attaining his heart's desire, which no poverty, no discords among family or friends, no lack of education, no hardships or misfortune could for more than a moment defeat or keep from eventual success. With all his lacks and all his faults, Audubon was probably one of the most selfreliant of the successful men of his age.

Mr. Arthur is one of the few biographers who have added substantially to our knowledge of Audubon's life history. Particularly noteworthy are his contributions to the history of the naturalist's most famous drawings, made in his favorite State of Louisiana, particularly in Feliciana Parish, the scene of many of his early discoveries. From him also we learn about the numerous persons with whom Audubon and his wife were most intimately associated, both there and at New Orleans, when his purposes were being set and plans for his life work were taking form. Many of the illustrations are new and show us Audubon's early facility with the brush and crayon point; and in an appendix is given an annotated list of all the originals for the plates of 'The Birds of America,' which should prove very useful.

Mr. Arthur frequently refers to William MacGillivray as Audubon's 'ghost writer,' which is fairly descriptive, but it should be added, I think, that Audubon was always his own publisher, so that he could not count upon such editorial assistance or supervision as nowadays the author legitimately expects from a responsible publisher.

The author devotes considerable attention to what is spoken of as "the enigma" or "mystery" of Audubon's birth and parentage, but he offers no final solution. After stating what Audubon's descendants believed, and what Audubon would have his wife believe, the reader is left to judge for himself. He does say, however, that the Dauphin theory is highly improbable, and he is convinced that Audubon was not a native of Louisiana; and he adds: "Was he the boy that was born to Jean Audubon at Aux Cayes, April 26, 1785? A preponderance of evidence appears to

<sup>1</sup> Arthur, Stanley Cilsby. *Audubon; an intimate life of the American Woodsman*. 8vo, pp. 1-518, 65 illustrations, 1937: Harmanson, New Orleans. Price \$5.00; limited edition, \$10.00.

prove that he was that little boy." I refrain from all further reference to this question since my own opinion has been expressed in the paper 'Audubon and the Dauphin,' which appears in the present number of this magazine.

The Latin phrases "terra incognitus" and "par nobile fratum" look very strange, but Mr. Arthur's painstaking work is very free from noticeable errors. There seems to be some misapprehension in the following: the royal family was imprisoned "in the towers of a feudal fortress, originally the abode of an ancient order of Knights Templar and called the Temple." The Temple did not designate any particular building, but was the name given to a district of Paris. In reality it was an enormous dominion, as Meade Minnegerode says, comprising a palace, a church, a fortress with big and little towers, the latter serving primarily as a donjon or prison, as well as gardens, markets and other facilities. In short it was a walled city within a city, and exercised its own jurisdiction and policing. In 1792 there were several thousand inhabitants.

Mr. Arthur's book is to be commended on all counts, but should have been given a stronger back to work its way in the world.—FRANCIS H. HERRICK.

Niethammer's '*Handbuch der Deutschen Vogelkunde*.'—Here at last we have an excellent manual<sup>1</sup> of the birds of Germany, intended to do for that country what the 'Practical Handbook' by Witherby has so well accomplished for the British Isles. No work has yet appeared which treats of the Reich's ornithology in small compass and in so comprehensive and authoritative a manner. Although originally conceived over twenty-five years ago by Hartert in cooperation with other German ornithologists, its preparation has been long delayed by the intervention of the World War and the death of some of the collaborators. The publication of the British 'Practical Handbook' meanwhile, at once demonstrated the value of such a work and spurred the authors to the completion of the first volume of the present manual, which in size and in some points of treatment conforms with the English work. The passage of time has not, however, been altogether a disadvantage, for it has enabled the inclusion of much new and valuable matter, not available until later years, such as migration data based on bird-banding.

In now bringing out this first volume, covering the passerine birds only, the editor acknowledges the constant assistance of Dr. E. Stresemann, who himself contributes a Foreword. The introductory matter includes first, a short bibliography of important works on German ornithology, including journals, standard authorities, local faunas, and selected titles dealing with field marks, migration, nests and eggs, and parasites. A chapter defining and illustrating terms precedes a key to the families of German birds, based chiefly on obvious arbitrary characters as size or colors. Similar keys in their appropriate places permit the student to run down the specimen or species in hand. The body of the work takes up each species in turn, giving the accepted name, German vernacular name, original citation, followed by a condensed description of the different races, their plumages, field marks, voice, migrations with general dates, manner of occurrence, habitat, food, nesting, and parasites (names only). Many points of critical value in the determination of closely related forms are depicted in diagrams, such as the wings of the species of *Phylloscopus*, with their differing formulas, while many small maps illustrate migrations of special interest. A single colored plate shows two races of Crested Tit and five of Yellow Wagtail that occur in Germany as resident or migrant forms. Altogether there is condensed here

<sup>1</sup> *Handbuch der Deutschen Vogelkunde* | im Auftrag der Deutschen Ornithologischen Gesellschaft | herausgegeben von Günther Niethammer | Band I: Passeres. 8vo, xxiv + 474 pp., 69 text-figs., 1 pl. (col.); Akademische Verlagsgesellschaft, Leipzig. Price RM. 15.

an immense amount of pertinent information, presented in attractive form for ready reference, so that undoubtedly this book will meet with an eager reception by both amateur and professional ornithologists. It seems the more regrettable therefore, that Old World conservatism should continue the use of certain names in nomenclature that have been abandoned on this side of the water, such as *Passeres* for *Passeriformes*, *Eremophila* for *Otocoris*, though to some extent these may be matters of opinion. The Holboell's, Greater and Hoary Redpolls are included as subspecies of *Carduelis flammea* and the genus *Passer* is retained without comment in the *Fringillidae*, notwithstanding its demonstrated position in the *Ploceidae*. One might have wished for more detailed migration dates. Several American species are included as stragglers, the Black-throated Green Warbler, Pipit and Catbird, Brown Thrasher, Robin, Olive-backed and Hermit Thrush. The book is well printed in large clear type, with appropriate side-headings and in contrast to its British counterpart, is of a size well suited for easy handling.—G. M. A.

**Nice on the Life History of the Song Sparrow.**—The painstaking studies carried out by Mrs. Nice on the Song Sparrow population of a limited area ('Interpont') near Columbus, Ohio, some of them already published here and abroad, are widely and favorably known. In the present extensive paper,<sup>1</sup> the author not only carries forward these researches in a brilliant manner but also provides a summary of her studies in the light of further experience. Selecting the Song Sparrow as an example of a common and widespread species, she has made over a period of eight years an intensive study of its habits and social behavior, with a view especially to gaining an insight into the varying composition and interrelations of the population not only at different seasons, but from year to year. The fluctuations following changes in the general environment, the effect of enemies, the influence of weather, as well as the normal sequence of events in migrations, nesting cycle and post-nesting activities have been followed with extreme care during the lifetime of many individuals, constituting the population of the area studied. The result is that for the first time we have a fairly adequate picture of the relation of the species to its environment and of the individual birds to one another, as well as of the course of events within the Song Sparrow community as a whole. It is safe to say that no such thorough field study has hitherto been made for any of the smaller American birds with the possible exception of the House Wren. The individual birds within the fifty-acre area were so far as possible trapped, banded, and their individual activities followed throughout each year so that it was possible to study the doings of the different birds, map their territories, record their several peculiarities, determine their manner of nesting, selection of mates and territory, the number of their nestings, the total of successes or failures, the annual reproduction rate necessary to maintain the average population and various other related matters in the normal life of the species.

In the first two years of study the conditions were optimum, and the population was able to maintain its level, but in subsequent years, through gradual clearing and destruction of cover, the environment was rendered less favorable with a consequent inability of the birds to make up for losses. In a brief review, it is impossible to give any adequate abstract of the work. A few points, however, may be mentioned. The sexes, though alike in plumage, play very different rôles: the male defends territory, mate and nest and shares in feeding the young; the female alone usually builds the nest, incubates and broods. Though apparently attached to each other

<sup>1</sup> Nice, Margaret Morse. 'Studies in the life history of the Song Sparrow.' Trans. Linnaean Soc. New York, vol. 4, vi + 247 pp., 3 pls. (1 col.), charts, maps, Apl. 1937. Price \$1.50 (care American Museum of Natural History, New York City).

in a given season, the union usually lasts for but a single season. Holding of territory is a fundamental trait, ensured by innate behavior patterns consisting of song, display and fighting, carried out in characteristic manner as carefully described. In autumn and winter, however, this jealousy is more or less relaxed, and the birds become somewhat social. Some Song Sparrows, particularly males, are resident in the area studied, others are migratory, but this status may be varied in different years by the same individual. Early in the season, even in February, warm weather, coupled with increasing day-length, induces migration; while in the autumn the reverse is the case, for cold then starts southward migration. Nesting, however, does not begin until April irrespective of warm or cold seasons, the important factor being perhaps, the increasing sunlight and its effect on the gonads. A well-situated population tends to maintain its numbers readily from year to year, but with less favorable conditions is less and less able to hold its former level. The age of adult birds extends to about two and a half years as determined both theoretically (Burkitt's formula) and by actual observation. In one case, however, a male bird lived to an age of between eight and nine years.

The author's thorough acquaintance with the literature of the subject and the problems involved, makes this study of exceptional value. She has brought together and critically analyzed an enormous amount of data, bearing on almost every aspect of the Song Sparrow's life history. Each of the twenty chapters is carefully summarized and there is a brief general summary of the entire contribution. As a model of careful and painstaking observational study of the life history of a wild bird, this excellent monograph should prove of unusually stimulating value.—G. M. A.

**National Geographic Society's 'Book of Birds.'**—Under the editorship of Dr. Gilbert Grosvenor and Dr. Alexander Wetmore, there are brought together in these two volumes<sup>1</sup> the series of articles on North American birds, north of Mexico, that have appeared from time to time in the course of the last six years in the 'National Geographic Magazine.' These papers, already familiar to a wide circle of readers, are here arranged as nearly as possible in the systematic order and continuously paged, so that together they form a splendid popular handbook of the birds of the United States and Canada, abundantly illustrated and at a reasonable cost. Each chapter takes up one group,—usually an order,—of birds, and opposite each colored plate, in double columns of print, are brief accounts of the characteristic habits and range of the various species there illustrated. The 204 plates "in full color" depict no less than 950 kinds of birds, including "all the major species" of these countries, and except for the plates of some of the warblers by Fuertes taken from a previous volume on birds, are the work of Major Allan Brooks. Naturally these plates vary in artistic merit and in excellence of reproduction; often it becomes necessary to show several species together on a single plate so that the individual figures lose somewhat through reduction. On the other hand, the advantages of lessened expense and of convenience in comparison of related species are obvious, and on the whole the result is quite satisfactory. The figures of the various jays, each of which has a half plate to itself amid natural surroundings, are exquisite examples of Major Brooks's best work.

The text accompanying the plates was prepared by several well-known ornitholo-

<sup>1</sup> The Book of Birds | the first work presenting in full color all the major | species of the United States and Canada | edited by | Gilbert Grosvenor . . . | and Alexander Wetmore | etc. Vol. 1, viii + 356 pp.; Vol. 2, 123 pp., illustr., National Geographic Society, Washington [1937].

gists, including Dr. Wetmore, Dr. T. Gilbert Pearson, Dr. Arthur A. Allen, Dr. Robert Cushman Murphy, F. C. Lincoln, E. R. Kalmbach, Major Brooks and Professor F. H. Herrick. Occasional chapters dealing with special subjects as hawking, sound-recording, bird migration and bird-banding are interspersed with those treating more especially of particular groups, and are illustrated with a wealth of excellent photographic figures, the greater part by Dr. A. A. Allen. The 'Table of Contents' is arranged alphabetically according to the first word of each chapter heading rather than by the sequence of chapters, a disadvantage perhaps. The weight of the coated paper necessary for the illustrations is offset by the division of the book into two volumes, each of convenient size and well indexed. The work is one that should have a wide popular appeal through its many attractive illustrations and the brief but readable accounts, supplying accurate information concerning so large a number of species.—G. M. A.

**Bent's 'Life Histories of North American Birds of Prey.'**—After a five-year interval, it is a satisfaction to record the appearance of another number (the tenth) of the well-known 'Life Histories' of North American birds,<sup>1</sup> in this instance Part 1 of the Falconiformes including the American vultures (Cathartidae) and the kites, hawks, eagles and osprey (Accipitridae). The falcons (Falconidae) are reserved for a second part. The treatment follows the same general plan as in previous numbers, giving for each species a general account of the habits, nesting and eggs, followed by descriptions of young, the plumages briefly, food, general behavior, range, migration and casual records. Where there are several subspecies, the life history of the best-known one is presented in detail, while in order to avoid duplication, the others are given only such additional mention as may be needed in each case. The accounts of two of the species (Black Vulture and American Rough-legged Hawk) were contributed by the late Dr. Charles W. Townsend, while that of the Turkey Vulture is from the pen of Dr. Winsor M. Tyler, and the one on the Gray Sea Eagle was written by Rev. F. C. R. Jourdain. The remainder of the volume was prepared by Mr. Bent himself, notwithstanding that he regards it as a "cooperative work" in which the notes contributed by over four hundred persons were utilized. In the general accounts of the different species, the author shows an unusual power of clear and intimate portrayal of his own wide field experience, here of especial value because he has made the raptorial birds a lifelong study. Under various headings, he not only draws deeply upon his own observations but has summarized practically all the important published matter as well as the notes of many correspondents, contributed for the purpose. The result is that in these 'Life Histories' we have a sifted and condensed mass of well-arranged facts relative to each species, that practically sums up our present knowledge. They thus form an indispensable reference work wherein one may find quickly the available information on almost any desired aspect of the life of these birds.

In work of this sort which involves the collation and evaluation of innumerable minor notes and references, it is impossible to avoid an occasional slip. Thus a note on page 197, concerning the nesting of Red-shouldered Hawks at Eastend, Saskatchewan, should, as its contributor writes me, refer to Swainson's Hawk instead. For the benefit of an ignorant public, it might have been a good plan to have summed up in more drastic manner the economic status of each species notwithstanding that under the heading of "Food," all the essential facts are presented. Particularly interesting

<sup>1</sup> Bent, Arthur Cleveland. 'Life histories of North American birds of prey. Order Falconiformes (part 1).' Bull. U. S. Nat. Mus., no. 167, viii + 409 pp., 102 pls., 1937. (For sale by the Superintendent of Documents, Washington, D. C., price 70 cents.)

are the articles on the California Condor and its haunts, the Sharp-shinned Hawk as a widespread bird-eating species, the Red-tailed and Red-shouldered Hawks in their somewhat antagonistic relations, and the Osprey with its specialized fishing habits. The plates present a wealth of photographic record, well selected to illustrate the habitats, nesting and appearance of nearly thirty species or races of the thirty-eight raptorial birds treated. The convenient size of these 'Life Histories' is an advantage in comparison with Bendire's two original volumes, nevertheless one cannot help the thought that a more sumptuous appearance would have been more in keeping with the worth of the contents.—G. M. A.

**Hesse, Allee and Schmidt's 'Ecological Animal Geography.'**—In spite of its formidable title, no one interested in the distribution and evolution of animal life can fail to find this a most interesting and stimulating book.<sup>1</sup> It is far more than a mere translation of Hesse's work on animal ecology. For both of the American collaborators are recognized leaders in their special fields and from their own wide field experience as well as from their knowledge of investigations made in this hemisphere, have effectively added to the original volume, which in itself covers much European literature less available here. It is a book to which a specialist in the study of any group of animals may well turn with profit in order to obtain a wider outlook on the general problems of distribution, the social relations of various types of animals, their behavior, and the far-reaching effects of the many environmental conditions under which they have developed. Within its nearly six hundred pages is assembled an enormous mass of data, drawn from many sources, published and unpublished, well digested and viewed in long perspective, an undertaking which, with the ever-increasing amount of investigation by biologists the world over, becomes in itself an herculean task. In the face of special interests, the authors have maintained an admirable sense of proportion in the treatment of the general aspects of the subject, although frequently one might wish for more details, as for example, when treating of the alpine faunas of the high mountains of Africa, which are dismissed with a sentence or two.

In a synthetic work of this sort the authors are perforce obliged to rely largely on the work of other investigators when dealing with matters outside their own special fields, hence it occasionally results that the older accounts when utilized, do not now reflect current opinion, as in the estimation of generic values, when faunas are contrasted, or as in the perpetuation of such tales as the happy community of Burrowing Owls, prairie dogs and rattlesnakes, or the use of its two long lower incisors by the kangaroo as shears to snip grass!

The subject is treated under four main divisions. The first considers the ecological foundations of zoogeography, reviewing the conditions of existence for animals and their effects, both immediate and secondary, upon animal life and its distribution. The succeeding sections take up the distribution of marine animals, then the life of inland waters and finally the factors affecting the distribution of land animals, emphasizing especially the communities of the latter as related to vegetation. The long-range aspects of historical change are well covered. With commendable good sense the Wegener hypothesis is given little weight as an explanation of many at first sight anomalous distributions, while multiple land bridges, at one time in vogue, are likewise shown to be largely unavailable. The authors tend to confirm the

<sup>1</sup> 'Ecological Animal Geography' an authorized, rewritten edition based on 'Tiergeographie auf oekologische Grundlage' by Richard Hesse' . . . prepared by W. C. Allee . . . and Karl P. Schmidt. 8vo, New York, John Wiley & Sons; London, Chapman & Hall; xiv + 597 pp., illustr. \$6.00.

explanation offered by Matthew to account for much of the distribution of both plants and animals as we see it at the present time, through occasional union of the continents at the north combined with secular changes in climate, making possible an occasional overflow from the Old World into the New, with some mutual interchange of faunas. The conclusion seems sound that "a division into faunal regions of general validity for all classes of animals cannot be maintained."

From an ornithological standpoint, the matter included is on the whole excellent, but might be so greatly amplified that a separate volume would be required to do the subject real justice. There is much use of the works of older authors with often insufficient rechecking to make their results commensurate with modern standards. Frequently one would wish for more detail, which the limits of the work cannot give, a fact which only proves its stimulating value. The relatively new subject of 'territory' in its relation to animal distribution is practically omitted. A suggestion worth following out, is that in directing their migration courses "it is specially differentiated belts in the atmosphere, and probably places with frequent ascending air currents, that the birds choose," while the ascent of air currents over water and forests by night may be a factor causing birds to migrate along river valleys and seacoasts, rather than the visual guidance of such features; or possibly both these influences come into play.

Throughout the work, the translation has been excellently done so that the reader is unaware of any idiomatic expressions of the original text. Technical terms are surprisingly few and no attempt is made to invent an ecological nomenclature such as is used for plants. At the end of each chapter are gathered in very condensed form the references to literature indicated by numbers in the text. It is a pity that these could not have been expanded into a full bibliography at the close of the book, but doubtless the limits of space forbade. This is a work well worthy of high place as a textbook and reference volume.—G. M. A.

**Delacour and others on Aviculture.**—Although the first volume of the original edition of this work was published only eleven years ago, it has long been out of print; hence the present new edition<sup>1</sup> will doubtless be welcomed by all who keep cage-birds, while its value to aviculturists is assured by the fact that M. J. Delacour as editor not only has contributed various chapters of the book, with much new matter, but also has enlisted the aid of other well-known authorities, in the preparation of special chapters. Thus, H. D. Astley treats of the thrushes and warblers; A. L. Butler of finches, larks and buntings; A. Decoux of waxbills, mannikins, grass finches and grosbeaks; E. G. Meade-Waldo of crows, magpies and jays; D. Seth-Smith of birds-of-paradise and bowerbirds; W. Shore-Bailey of weavers and whydahs. The introductory pages give clear and simple directions for the general care of small birds, their housing, feeding, transportation, treatment in sickness, and other phases, that seem of very practical value. The volume covers the Passeriformes only, taking these up group by group, with first a general statement of the characteristics of each type, then a list of the species commonly found in the bird markets, with brief diagnoses and a few words on their adaptability and general geographic range.

Partly on account of restrictive laws, aviculture, except for the conventional canary and parrot, is less an avocation in this country than abroad, so that the book is written more especially with a view to helping bird fanciers of the Continent and the British Isles; but for the amateur it is at once a helpful guide and a manual of

<sup>1</sup> 'Aviculture | a treatise on the management | of foreign and British birds in | captivity.' | Published by the Avicultural Society | Volume I | 1936. 8vo, xv + 298 pages, 27 plates (9 in color), 1936, Stephen Austin & Sons, Ltd., Hertford, England.

the species that reach European markets. Technicalities have been carefully avoided, but too great a conservatism in the use of Latin names results often in their being out of accord with more recent usage, while greater care might have avoided such mistakes as *Sitta carolina* for *S. carolinensis*, *Icteria viridis* for *I. virens*, and others, which should have been corrected in a new edition. The very brief accounts of habits often contain interesting notes on captive birds. Thus a hand-reared female Crested Lark (*Galerida*) sang as well as any male, raising its crest while so doing. The American Robin, Hermit Thrush, Catbird and Mockingbird have been successfully bred in Europe, but these as well as the Bluebird and other North American species now seldom reach the continental markets owing to the effectiveness of prohibitive measures. The chapter on birds-of-paradise is especially full and contains many items of interest and value.

The book is well printed despite occasional misspellings, due no doubt to the fact that the original French text had to be first rendered into English. Of the twenty-seven plates from photographs and drawings, nine are in colors and vary in excellence; those by Grönvald are especially attractive and striking notwithstanding the conventional arrangement of figures. "Aviculture is a scientific pursuit and a source of unending interest and pleasure," we are told in the Introduction, but the editor wisely adds that it should not be undertaken unless one is prepared to devote the time and effort necessary for the proper welfare of the birds.—G. M. A.

**Danforth's 'Pájaros de Puerto Rico.'**—In this convenient little volume<sup>1</sup> we have for the first time a popular handbook of the birds of Porto Rico, intended for the use of local students, teachers and others interested in the native birds, written in Spanish, which is still the familiar tongue of that island. The author's acquaintance with the Porto Rican avifauna is the result of continuous residence there since 1921 and in this period he has himself done much to advance our knowledge of the local species, and to encourage measures for their protection. The plan of the work is simple. After a brief introductory chapter setting forth the esthetic and practical value of birds, and the more notable publications dealing with those of Porto Rico, there follows the main part, which lists the island species, giving first the local Spanish names, then the current Latin name, followed in each case by short paragraphs giving a clear description, a statement of the nesting, then the status whether resident or migrant, with in the latter case the general dates, and finally a few short notes on the habits or other important points. The sequence and nomenclature are so far as possible those of the 'A. O. U. Check-list.' Two African weaverbirds are well established as relics of the slave trade, but the introduced Cuban Quail is now exterminated thanks to the mongoose, itself an importation. To its depredations is also believed to be due the extinction of the Porto Rican Chuck-will's-widow, of which but a single specimen, taken in 1888, is known. The body of the book includes 182 numbered species and is followed by a summary list of these and an appendix giving nine doubtful species in addition. Three separate indexes, in which the birds are listed by their Spanish, Latin and English names, respectively, should make the contents readily available while numerous illustrations help to visualize the descriptions. Many of the black-and-white text-figures are from the work of James Bond, with the addition of half-tone reproductions of well-mounted specimens in the Field Museum. Ten colored plates by Miss Frances W. Horne illustrate a number of the species, and though the figures are small and somewhat stiff in pose, help to enliven the book. These with the very clear and well-printed text and untechnical descrip-

<sup>1</sup> Danforth, Stuart T. 'Los pájaros de Puerto Rico.' Small 8vo, x + 198 pages, illustr., Rand McNally & Co., New York and Chicago, 1936.

tions should make it of great value to its intended users, and it will undoubtedly prove of timely aid in encouraging among our island neighbors a sympathetic interest and a much needed appreciation of birds.—G. M. A.

## PERIODICAL LITERATURE

AIKEN, CHARLES E. W. *Birds of the Southwest*. Colorado College Publ., gen. ser. no. 212, 73 pp., 1 pl., map, March 1937.—Professor Edward R. Warren here presents a biography of the late Charles Aiken (1850–1936), together with his diary of two early visits to Arizona and the Gila River in 1874 and 1876 for ornithological exploration. Other matter includes an official report on the first of these journeys, four short notes on birds, fragments of a diary and a list of birds seen or taken on his 1876 trip. Together they form an item of interest in the pioneering days of the Southwest. Aiken was born in Benson, Vermont, but early went to Chicago, where his boyhood days were spent. Following the great fire of 1871 he removed to Colorado Springs, where he opened in 1874 a taxidermist's shop, and carried on this business as well as that of a furrier, until the time of his death. His large private collection of birds amounting to nearly six thousand specimens was purchased in 1907 for the museum of Colorado College.

ATTILA, ULJAS. Ein neuer Apparat zur Registrierung der Intensitätsvariation der Zugenruhe bei gekäfigten Zugvögeln. *Ornis Fennica*, 14: 38–43, 2 text-figs., March 1937.—An ingenious mechanism is described and illustrated, whereby the night-time activity or restlessness of caged migratory birds at the season of migration can be definitely recorded as to time and duration by movements of a needle on paper.

BANNERMAN, DAVID. A review of the genus *Calamoecetor* Selater (formerly *Calamornis* Sel.). *Ibis*, (14) 1: 294–301, Apl. 1937.—Two forms of this swamp warbler, a large and a small, occur living in close proximity, if not side by side over a wide area of tropical and subtropical Africa. The present revision is a great improvement on previous summaries, including Selater's 'Systema Avium Aethiopicarum,' in that the various described birds are arranged for the most part as subspecies of either one or the other of the two types. The larger bird is *C. rufescens* with five races in addition to the typical one, besides an Angolan and a Cape Verde Island relative, which are retained as full species. The smaller bird is *C. leptorhyncha* with six additional races.

BATES, GEORGE L. *Birds of Jidda and central Arabia collected in 1934 and early in 1935, chiefly by Mr. Philby*.—Part IV. With notes by H. St. J. B. Philby.—*Ibis*, (14) 1: 301–321, pls. 8a, 9, Apl. 1937.—This concluding part covers the pigeons, sand grouse, shorebirds and partridges with their allies, found in central Arabia. Many interesting notes on geographic distribution and habits are given on the birds of this little-known area. The local form of Rock Dove was found consorting with tame pigeons on the Mecca road. Ticks were found to be an important food item of these birds. No less than six species of sand grouse were taken. The Spur-winged Plover is for the first time recorded from Arabia, a small party of five or six birds. The new form, *Alectoris graeca philbyi*, is illustrated as well as a desert woodpecker, *Desertipicus doriae*.

BATES, R. S. P. Do birds employ ants to rid themselves of ectoparasites? *Journ. Bombay Nat. Hist. Soc.*, 39: 394–395, Apl. 15, 1937.—A further contribution to this subject. A Song Thrush in Kent, England, was watched for several minutes apparently "bathing" in red ants, which issued from a crack in the flags. "Not only did it pick up one, two, or sometimes three ants in quick succession and stuff

them in between the tail feathers, into the tail coverts, primaries, and under the wings, but, with tail and wings outspread, it often wallowed amongst the ants which could be seen swarming all over it."

- BEDFORD, O. H. The Ostrich in China. *China Journ.*, **26**: 77-78, 1 pl., Feb. 1937.—In a courtyard of a residence in Peiping, China, is a tomb brick of the Han dynasty, on which in repeated stamped design is shown an Ostrich drawing a light two-wheeled cart. This is taken as the earliest evidence of the presence of the Ostrich in China in historic times, since the brick dates back to about 150 B. C. According to an encyclopedia of that time, it was called the la-chüeh or Great Bird, and was described as having the body and neck like those of an eagle, feet like a camel's, its color tan, and height eight or nine feet when erect. Its diet was barley. Another record of that time states that it existed in the Fantou Kingdom, 11,600 li distant from the present Sian-fu. About 140-87 B. C., the King sent among other tribute Ostrich eggs. Fossil eggs are known from Shantung, Hopei, Shansi and southern Mongolia.
- BELCHER, SIR CHARLES, AND SMOOKER, G. D. Birds of the colony of Trinidad and Tobago. *Ibis*, (14) **1**: 225-249, April; 504-550, July, 1937.—These two parts conclude the notes on the occurrence and breeding of the Passeriformes in these islands. Among other North American migrants, the Bank Swallow seems to be for the first time reported. Barn Swallows occur on passage but apparently in declining numbers of late years. The parasitic habits of the Rice Grackle upon the Cacique are briefly mentioned, and a list of hosts of the Glossy Cowbird is given. No attempt is made to include the literature on Trinidad birds.
- BELL, FREDERICK. Lead poisoning of ducks, investigated. *The Flicker*, **9**: 1-2, May, 1937.—In early December, 1936, at Bear Lake, Minnesota, extensive lead poisoning of ducks was found. Many dead and dying birds were noted, which when examined in the laboratory were found to contain an average of over ten shot each in the alimentary tract; the highest number of shot in any bird was 49. They showed the characteristic symptoms of lead poisoning. In one was found the blood parasite, *Leucocytozoon*. The American Coot collected contained no shot, but one was parasitized by a fluke.
- BENSON, C. W. Miscellaneous notes on Nyasaland birds. *Ibis*, (14) **1**: 551-582, July 1937.—Among many notes on birds made during three years in Nyasaland are: sixteen species of Palaearctic breeding waders occur in migration; four species of honey-guides were collected. Several forms are for the first time recorded from Nyasaland.
- CHAPMAN, FRANK M. Fuertes and Audubon—a comparison of the work and personalities of two of the world's greatest bird artists. *Natural History*, **39**: 204-213, figs., March 1937.—Comparing the standards and methods of these two great artists "would be a thankless task. . . . Each was the greatest bird painter of his day. Each was inspired by standards that defied time and strength and patience and was satisfied only when he had given his best. But the standards of Fuertes' day, reflecting developments of a century and the criticism of his associates, were the higher and to him was given the power to meet them." The figures reproduce a number of bird portraits and studies by Fuertes.
- CREUTZ, GERHARD. Zur Brutbiologie des Trauerfliegenschnappers. *Beitr. z. Fortpflanzungs-biol. d. Vögel*, **13**: 95-97, May 1937.—The European Blackcap breeds commonly in Saxony and shows much latitude in its choice of sites, nesting even in cavities of trees or in nest-boxes in gardens. Only one brood is raised a season in contrast to *Muscicapa striata* which is double-brooded. Nest-building

begins about two weeks after the birds arrive in spring. Eggs are usually six or seven in number, and in the larger broods there are usually one or two 'runts' which seem under-nourished. Adults return in successive years to the same spot, but the young seem to scatter elsewhere, for of 221 banded young none was retaken the following year in the region, although the number of nesting pairs actually showed an increase.

- DALKE, P. L. Food habits of adult pheasants in Michigan based on crop analysis method. *Ecology*, **18**: 199-213, April 1937.—A paper that should prove of considerable utility to those interested in intensive pheasant management in similar areas. A high percentage of cultivated grains,—mostly waste,—is eaten. The most common wild seeds taken were ragweed, yellow foxtail, skunk cabbage, and green foxtail. "Adult pheasants are not large consumers of insects and other invertebrates in comparison with plant food eaten. The common belief that grasshoppers are consumed in large quantities is not borne out by the investigation." A good summary,—and three typographical errors. A description of the "playing" of pheasants should, if published, interest students of bird behavior. —W. V.

DELAMAIN, JACQUES AND MAURICE. Le tambourinage des pics. *Alauda*, (3) **9**: 46-63, 4 text-figs., 1937.—A study of the drumming of the Greater and Lesser Spotted Woodpeckers, with an account of the sort of resonant drumming places used by the birds. Both sexes of a pair may drum at the same spot but not at the same time. A dead stub or knot is tested at various points to find the most resonant spot. The birds may have more than one drumming spot and when, early in the nesting season, one sex drums, the other may reply and come to the tree. The drumming does not result in abrading the wood surface, and the motions involved, concerning which there has been discussion, resemble the series of rebounding movements of a bouncing ball. As the season advances the drumming periods become shorter and in France end about the third week in June.

DEMANDT, C. Beobachtungen an einem westdeutschen Wanderfalkenhorst. *Beitr. z. Fortpflanzungs-biol. d. Vögel*, **13**: 99-100, May 1937.—The Duck Hawk is common in the region of the Weser and the Rhine in western Germany, and has increased in numbers of recent years due to protection. Near Lenne a pair nested for the first time in 1934 and remained throughout the year, in winter hunting at distances up to fifteen km. from the nesting site. In 1936, the brood perished, apparently as the result of a late snowstorm. This pair of falcons seemed not to disturb the small birds nesting in the vicinity of the eyrie.

EATES, K. R. The status of the Koel [*Eudynamis scolopaceus* (L.)] in Sind. *Journ. Bombay Nat. Hist. Soc.*, **39**: 406-414, map, Apl. 15, 1937.—In this part of western India this bird has been increasing steadily and extending its range during the last twenty years. It is a parasite of the Sind House Crow, and in one instance no less than six of its eggs were found in a crow's nest.

FRANKE, HANS. Aus dem Leben der Beutelmeise. *Beitr. z. Fortpflanzungs-biol. d. Vögel*, **13**: 85-94, 3 text-figs., May 1937.—In Austria the Penduline Titmouse appears in the latter half of March and remains till about the third week of October. The pendulous nest is constructed of long fibers of wild hop and the down of willows or poplars. In April nests, the willow down and in May nests the poplar down are used, and these two species of tree are preferred as nest sites. Eight stages in the construction of the nest are recognized, beginning with the weaving of an anchorage near the end of a long twig, then the construction of a ring to form the entrance, from which the pocket-like bag depends. Finally the cylindrical

entrance tube is built out from the entrance as in the case of certain weaver-bird nests. Two nests were found each with two entrance tubes on opposite sides, both in use for coming and going. Three weeks are required for the completion of the nest. In May after the brood nest is completed, extra nests may be found in various degrees of construction, but it was not determined if these are made by one or both sexes. Nests are usually placed on the side of the tree away from the prevailing east and southeast winds of spring.

GRISCOM, LUDLOW, AND GREENWAY, JAMES C., JR. Critical notes on new neotropical birds. *Bull. Mus. Comp. Zool.*, 81: 417-437, May 1937.—Study of collections from the Amazonian, Surinam, and Brazilian regions has resulted in the detection of the following new forms: *Crypturellus soui decolor*, Para, Brazil; *Micrastur mirandollei extimus*, Permé, eastern Panama; *Psophia viridis interjecta*, Cametá, Para, Brazil; *Leptotila rufaxilla hypochroos*, Paramaribo; *Amazona amazonica micra*, Surinam, Pomonakreek; *Graysidasculus brachyurus insulsus*, Lago Grande, Rio Amazonas; *Tyto alba hellmayri*, Paramaribo; *Nyctiphrynus ocellatus brunneus*, Bahia; *Nyctipolus nigrescens duidae*, Mt. Duida, Venezuela; *Caprimulgus rufus minimus*, Panama City; *Hydropsalis climacocerca canescens*, Para, Brazil; *Pharomachrus pavoninus viridiceps*, lower Amazon; *Galbula leucogaster viridissima*, Rio Tapajoz, Pinhy; *Ramphastos tucanus oblitus*, Rio Tapajoz, Tanuary; *Pteroglossus aracari vergens*, Valparaíso, São Paulo; *Selenidera maculirostris hellmayri*, Rio Tapajoz, Boim; *Chrysomitris punctigula pallidior*, Rio Amazonas, Lago Grande; *Cerchneipicus tinnunculus angustus*, Para; *Nasica longirostris australis*, Santarem; *Ancistrops strigilatus cognitus*, Tauary, Para; *Philydor erythropterus diluvialis*, Para; *Xipholena lamellipennis pallidior*, Santarem; *Todirostrum latirostre senectum*, near Obidos; *Molothrus bonariensis riparius*, Pinhy, Rio Tapajoz; *Tanagra cayana littoralis*, Paramaribo; and *Habia rubica hesterna*, Patua, Para.

HAMPE, HELMUT. Zur Biologie des Rosellasittichs, *Platyercus eximius*. *Journ. f. Ornith.*, 85: 175-186, 7 text-figs., April 1937.—The Rosella Parrot of Australia readily adapts itself to life as a cagebird. Its food consists in a free state of various seeds, fruits and to some extent, insects; and in captivity it thrives on a mixed diet of oatmeal, toast, ant pupae and green stuff, with codliver oil, charcoal powder or lime. The characteristic movements, calls and social behavior are described as well as the display actions and threat attitudes or actions toward intruders. Cagebirds will breed when a year old. Birds may safely be said to be capable of breeding up to an age of from twelve to fifteen years. Development and growth of the young are described in detail.

HEIM DE BALSAC, HENRI. Une conséquence inattendue de la dissémination de la belladone par les oiseaux. *Alauda*, (3) 9: 122-123, 1937.—An unexpected result of the spread of seeds of deadly nightshade (belladonna) by birds, is established. When such seeds are scattered in pastures, and cattle (immune to the alkaloids of this plant) feed upon the resulting growth, the poison concentrates in the liver of the animal. Such livers, when used in the manufacture of certain medicinal extracts, may retain the poison in these extracts, hence certain maladies treated by this extract may result in showing typical symptoms of intoxication. Similar effects may result from eating the livers of cattle that have fed on belladonna plants. The means of prevention is to root out the plants from the pasture.

HENZE, OTTO. Neue Wege des Vogelschutzes im Obst und Gartenbau. *Veröffentlichungen Württ. Landesstelle f. Naturschutz*, 13 (1936): 157-162, 2 photos, 2 tables, 1937.—On a farmstead of about 25 acres, embracing an orchard of 1500 fruit trees, conditions were favorable for birds and special measures for attracting

and protecting them had been taken, including the provision of fifty nest boxes formed of hollowed-out sections of trees. House Sparrows (*Passer domesticus*) and Field Sparrows (*P. montanus*) occupied all of the nest boxes and had driven away the titmice, redstarts, and flycatchers until in 1932 not a single pair of such birds nested on the place. In that year, despite the number of sparrows present, looper caterpillars defoliated the apple and cherry trees. The Field Sparrow (especially in the nestling stage) consumed some loopers but occupied only twenty of the fifty nest-boxes; House Sparrows, in possession of the remainder, were of even less value as destroyers of caterpillars.

Realizing that a change must be made, the proprietor, in the autumn of 1932, removed all of the nest boxes, closed all tree cavities, and put up 100 new bird houses of a type easily opened, and provided with cat guards. In 1933 the number of houses was doubled, and in 1934 trebled. In four years (1933-36), 500 nestlings of useful species were reared, largely on insects injurious to the orchard, and 3000 young House and Field Sparrows were allowed to live through the period of maximum consumption of insects, then eliminated. This treatment did away with objectionable flocks of sparrows. The number of destructive insects steadily decreased during the four-year period until at last there was only a small fraction of the original population.

Conclusions drawn are that (1) nest boxes not properly inspected and controlled aid the enemies of orchards; (2) the boxes should be of a type easily opened and cleaned; (3) all young sparrows should be destroyed and all useful species preserved; and (4) in the instance described, orchard insects were so reduced in numbers as to be negligible. Commercial and political propaganda in the article are here ignored.—W. L. M.

HINDWOOD, K. A. The flocking of birds with particular reference to the association of small insectivorous birds. *Emu*, **36**: 254-261, pl. 35-36, Apl. 1, 1937.—These notes are interesting for comparison with similar habits in small insectivorous species in other lands. Just as in our northern woods, where chickadees form the activating basis of miscellaneous flocks of warblers, nuthatches, small woodpeckers and kinglets in the autumn, so in Australia the *Sittellas* provide leadership and a mixed flock of various species of small birds troops from tree to tree, always with more or less calling which serves to keep the group together as well perhaps as to space the birds. The cause of such an association is not only the common desire for food at the given time, but no doubt a strong desire for a certain sociability is a chief factor in the cohesion of the group.

HORST, FRITZ. Wie gross ist das Jagdgebiet des Wanderfalken? *Beitr. z. Fortpflanzungs-biol. d. Vögel*, **13**: 98-99, May 1937.—One pair of Duck Hawks nested in southwestern Germany for eighteen seasons on the same cliff. During ten of these years a second pair settled some 13.5 kilometers away, nesting on cliffs. They hunted during the breeding season at distances of from four or five up to eleven km. from the nest. The bird is commoner in North Germany where suitable nesting sites are more numerous.

HYEM, E. L. Notes on the birds of "Mernot," Barrington, N. S. W. *Emu*, **36**: 262-272, pl. 37, Apl. 1, 1937.—A list replete with interesting local notes. Possibly polygamy is indicated in the case of *Sittella*, three of which are often seen building one nest or feeding one brood. Brown-headed Honey-eaters in their desire for hair to line their nests will often pluck it from the backs of cows in pasture or from kangaroos. The author once had a White-eared Honey-eater alight on his own head and pluck out a few hairs! A Gray Butcherbird was seen to capture a

small bat at dusk, but having killed it, dropped it. The European Starling has greatly increased in the region of recent years; one bird was an especially good mimic, imitating the calls of at least four native species.

KENDEIGH, S. C., AND BALDWIN, S. P. Factors affecting yearly abundance of passerine birds. *Ecological Monographs*, 7: 92-123, January, 1937.—Statistical methods are applied to House Wren populations on 15 acres over 14 years. The "following yearly averages were obtained: number of adults, 19.7; sex ratio, 109.6 males: 100 females; number of broods during first and second breeding periods, 7.8, 6.0; broods per female, 1.5; percentage increase in number of birds during breeding season, 284; percentage of polygamous cases of breeding, 5.2; and percentage annual mortality, 72.8 . . . the non-breeding population . . . may amount to one-sixth to one-third of the total population during the first breeding period and one-third to one-half during the second . . ." Other significant facts and conclusions, too numerous for quotation here, are given. It seems dubious whether *Troglodytes aedon* may be assumed to be "a typical passerine bird"—whether, indeed, a "typical" passerine exists—and whether, as a consequence, the authors are entitled to generalize, especially since their observations are based on only 15 acres.—W. V.

KOENIG, ALEXANDER. Bericht über ein in der Freiheit gesammeltes Ei von *Bucorvus abyssinicus* (Bodd.). *Beitr. z. Fortpflanzungs-biol. d. Vögel*, 13: 113-114, May 1937.—An account of the discovery of the nest of a Ground Hornbill in the hollow trunk of a large *Podocarpus* tree on Simba Farm, Ngare Nairobi, in the Kilimanjaro region of East Africa. It contained a single egg, in which incubation had already begun on December 10, 1935. The hollow of the trunk was about breast-deep and was lined with a few dry leaves. Both birds were very shy and had been previously observed to exchange places on the nest at midday. The egg is shining white, thickly beset with excrescences.

LILLIE, FRANK R., AND JUHN, MARY. The origin of the after-feather in Fowl: a process of twinning. *Science*, new ser., 86: 38-39, July 9, 1937.—In the developing feather, the place of origin of the barbs is here designated the ventral locus, a single center at or near the mid-ventral line of the formative ring or collar surrounding the base of the feather germ and enclosing the neck of the pulp. At this formative center and on its opposite sides the barbs are constantly being initiated during growth. Shortly after regeneration starts, the formative center divides, and from the inner one develops the aftershaft which is a mirror image of the mainshaft.

LIVESEY, T. R. The habits of vultures. *Journ. Bombay Nat. Hist. Soc.*, 39: 308-309, Apl. 15, 1937.—The vultures in Burma are found to soar when the "day begins to heat up," after the early hours of the morning. They may so continue to levels of "several thousand feet," probably as much to escape the heat of the lower levels as to search for prey. In finding this, they especially, he believes, watch the dogs, wolves and jackals, as well as crows, the actions of which often betray the whereabouts of a carcass.

LÖNNBERG, EINAR. Die kurzschnäbelige Saatgans, *Anser fabalis curtus* Lönnb. *Ornith. Monatsber.*, 45: 73-74, May 2, 1937.—The author reaffirms his belief that this is a valid race. Originally described from specimens from Shansi, China, the Short-billed Goose is believed on evidence brought forward, to be the breeding race of the Taimyr peninsula and adjacent parts of western Siberia.

LOWE, WILLOUGHBY P. Report on the Lowe-Waldron expeditions to the Ashanti forests and northern territories of the Gold Coast. *Ibis*, (14) 1: 345-368, pl. 10,

- Apl. 1937.—The first part of a list of the birds obtained in 1933-34 and again in 1934-35, in the Gold Coast Colony, including many rare or little-known species. The forest fauna is chiefly represented, with open-country birds in clearings and other suitable areas. The Vulturine Fish-eagle feeds chiefly on fruit of the oil palm in season and is described as good eating. The natives have nearly everywhere domesticated the guinea fowl, *Numida meleagris galeata*, with the result that very soon the majority of such birds become pied.
- LUDLOW, F. The birds of Bhutan and adjacent territories of Sikkim and Tibet.—Part II and III. With notes by N. B. Kinnear. *Ibis*, (14) 1: 249-293, Apl.; 467-504, July, 1937.—These two parts conclude the listing of the collections from this relatively little-known region, with critical remarks on many of the forms, and much valuable data on altitudinal distribution. A new race of the Brown Dipper, *Cinclus pallasi dorjei*, from eastern Bhutan is described. Of the Rose Finch, *Pyrhospiza punicea*, the paucity of red-colored males inclines the author to suppose that the species is dimorphic. Probably as with other red finches, not all adult males attain the full development of this color. Both gray and rufous phases of the owl, *Glaucidium brodei*, occur.
- MATHEWS, GREGORY M. Remarks on Procellarian and Puffinine petrels. *Emu*, 36: 273-280, Apl. 1, 1937.—The remarks take the form of a key to the characters of the shearwaters of the genera *Procellaria*, *Calonectris*, *Ardenna*, *Puffinus*, *Alpha-puffinus* and *Reinholdia*.
- MEYLAN, OLIVIER. Contribution à l'étude de l'avifaune des Alpes. 4.—La Haute-Maurienne. *Alauda*, (3) 9: 22-42, 1937.—In this portion of the French Alps, birds occur as high as the 3000-meter level as nesting species. A list with annotations details the species of these upper levels. On a recent excursion the author found no evidence that the Bearded Vulture still occurs here, although the region is supposed to be one of its last strongholds in the Alps. It may already be gone. Skylarks occur in the upland meadows to 2700 meters. Above this level the Snow Finch is found locally in small groups to the height of some 3300 meters.
- MILLER, ALDEN H. Structural modifications in the Hawaiian Goose (*Nesochen sandwicensis*), a study in adaptive evolution. Univ. of California Publ. in Zool., 42: 1-80, pl. 1-6, 12 text-figs., Apl. 30, 1937.—The external characters, skeleton and hind-limb musculature are described in this goose and comparisons of various features made with *Branta*, *Anser*, *Chen*, *Philacte* and *Cloëphaga*. The Hawaiian Goose is probably nearest related to *Branta* but is peculiarly adapted for life on the dry lava uplands of the Hawaiian Islands, through modification of its feet and musculature for running and climbing over dry ground. The interdigital membranes are reduced, the toes strengthened, and the nails lengthened for this method of life, while the swimming power and flight power are much lessened. The skeleton reflects these adaptations very little. Correlation is considered between muscle development and muscle function as shown in the habits of this goose.
- MILLER, R. S. The Helmeted Friar-bird. *Emu*, 36: 249-253, pl. 33-34, Apl. 1, 1937.—This plain-colored honey-eater is a resident of the coastal areas of northern Queensland, where it inhabits various types of country but nests usually near water and flowering trees. The rather large nest is pensile, suspended from the fork of a branch. Four or five eggs are laid, in the defence of which the birds are unusually aggressive, even striking the intruder's head if he approach too closely. The old nests are frequently used by other birds such as the Red-browed Finches, Banded Finches and even doves. A common parasite is the Eastern Koel. The food is largely insects taken in the air, and the nectar of flowering trees.

MOREAU, R. E., AND MRS. W. M. Biological and other notes on some East African birds.—Part II. *Ibis*, (14) 1: 321-345, April 1937.—Among many interesting points, *Pitta angolensis longipennis* is believed to be a seasonal migrant in East Africa. Two nests of the large Green Bush-shrike, *Nicator chloris gularis*, are described, one with two eggs, the other with two young. The two Violet-backed Sunbirds (*Anthreptes longuemarei neglectus* and *A. orientalis*) of which one is regarded by Selater as a race of the other, occur, it is found, in ecologically different surroundings in the same districts and keep entirely distinct. They are thus regarded as separate species. The interrelationships of the described species of Golden Weavers are discussed.

MOSTLER, GERHARD. Versuche zur Gedächtnisleistung der einheimischen insektenfressenden Vögel. *Zeitschr. f. Naturwiss. d. Naturwiss. Ver. f. Sachsen u. Thüringen*, Halle, 91: 102-121, 1937.—The author concludes, from experiments with various native insectivorous birds, reared from nestling stages, that they learn to choose their food by trial and error, and that the number of such trials necessary to learning, is extraordinarily small. Having once learned that certain insects are distasteful, the memory of this is retained, from three to six months, or even longer. Experiments show that the birds are guided in discrimination by the sense of sight alone, and the sense of smell appears to play no part.

NORDBERG, SVEN. Biologisch-ökologische Untersuchungen über die Vogelnidicolen. *Acta Zool. Fennica*, 21: 1-168, 4 text-figs., 1936.—An extensive account of the arthropods found in birds' nests in Europe, whether truly parasitic species or not. These include isopods, myriapods, podurans, earwigs, psocids, mallophagans, many beetles, flies, fleas, ants, spiders and mites. These many nidicolous species are considered according to the groups of birds in whose nests they occur, their distribution in different layers of the nests, their food requirements and ecological characteristics. Many species may find the desired nests by scent, and the nidicolous fauna may be quite different when the nest is new, from what it is if the nest persists a second year or more.

PALMGREN, PONTUS. Ueber einen auffälligen Massenzug, nebst Erörterungen über die zugstimulierenden Witterungsfaktoren und den Richtungssinn der Vögel. *Ornis Fennica*, 14: 4-17, March 1937.—An account of an unusual migration wave in Finland on April 14, 1936, in which great numbers of Bullfinches, Fieldfares and Skylarks were noted in unbroken streams passing from west-southwest. The approximate extent of the movement is plotted and its correlation with the front of a mass of polar air in contact with warmer air is suggested as a cause of the direction maintained by the migrating birds, with the possibility that birds may be sensitive to electromagnetic currents set up by these air masses and orient themselves by them, notwithstanding the lack of any positive evidence.

PETERS, JAMES L. A new genus for *Pseudopteryx solomonensis* Hartert. *Journ. Washington Acad. Sci.*, 27: 81-83, 15 Feb. 1937.—For this owl of the Solomon Islands, a new genus, *Nesasio*, is proposed, which proves to be not a bubonine but a strigine owl. It is probably derived from "an offshoot of *Asio flammeus* stock." It is proposed, further, to disregard as a generic character the feathering of the tarsi and feet in owls, since "where a genus is widely distributed with representatives in both temperate and tropical regions the feathering on the toes of the tropical forms varies from sparse to bristly and in some species of *Otus*, for instance, the toes are quite bare."

RICHTER, ROLAND. Einiges über die Lebensweise des Eissturmvogels (*Fulmarus glacialis* L.). *Journ. f. Ornith.*, 85: 187-200, 10 text-figs., April 1937.—Unlike

many of its relatives, the Fulmar is largely active by day and nests in open situations rather than in holes. During the last fifty years it has enormously increased in numbers in the British Isles. The writer has studied a colony of twelve years' standing on the Scottish coast where the birds arrive on their breeding areas even in mid-December, much earlier than in the North Sea. Breeding follows in spring, and then the number of birds at the colony fluctuates daily when the birds probably go far to sea for food. Fishing boats are followed for the refuse parts of fish thrown over and fish are even captured and opened for their livers. Squid form an important article of diet, the digestion of which results in the pinkish liquid ejected by the Fulmar on being disturbed. A pair becomes much attached to a definite spot, returning year after year. The incubation period in one case was 57 days, which corresponds well with a 58- to 60-day period reported by others. The young in the last week or two of nest life are fed little or not at all.

RINGLEBEN, HERBERT. Ueber die Umstellung in der Ernährungsweise der Ringelgans (*Branta bernicla*) infolge der Seegraskrankheit. Ornith. Monatsber., 45: 82-83, May 2, 1937.—Before the appearance of the eel-grass disease on the coasts of Denmark and Germany, *Zostera* formed the main food of wintering Brant and Red-fronted Geese. In the spring of 1935 a flock of about a thousand Brant was present in the Schlei, but the disease meanwhile had made such headway that there was insufficient food for the birds, which ate the diseased eel-grass either not at all or in diminishing quantities. As a result the birds were forced to feed instead on the short grass growing on the flat parts of the neighboring island of Schleimünde. The same thing was noted in 1936 but the flock of Brant was much smaller, about four hundred birds. They paid no attention to the salt plants along shore but would spend almost the entire day on the grass flats feeding, then flying out to sea for the night. Barnacle Geese apparently underwent a similar change in diet.

RULLIER, —, AND HEIM DE BALSAC, HENRI. L'infection des oeufs de cane et son mécanisme; fréquence, dangers, précautions hygiéniques. Alauda, (3) 9: 95-109, 1937.—Contamination of ducks' eggs by pathogenic bacteria is common, and may be intermittent so that one laying of eggs may be infected, and a previous one not, a result perhaps of an endogenous discharge from time to time in the oviduct. Eggs of the domestic duck should therefore be subjected to thorough cooking before being eaten as food. Such bacterial infection appears to be independent of copulation and is not a necessary result of it.

SÄLIM, ALI. The ornithology of Travancore and Cochin. With notes by Hugh Whistler. Part VII. Journ. Bombay Nat. Hist. Soc., 39: 320-342, Apl. 15, 1937.—This portion of the list contains the bubonine owls, the Falconiformes, and Columbiformes, with brief notes on status and breeding times. The known range of the Indian Great Horned Owl is extended to southern Travancore.

SCHULZE, PAUL. Die erste Zecke von einer Salangane, *Ixodes colloclaiæ* n. sp. von Neupommern. Ornith. Monatsber., 45: 77-80, 1 text-fig., May 2, 1937.—The first known tick from an Edible Swift is described and figured, from a female individual. The unknown male is conjectured to haunt the caves where the birds breed.

SICK, HELMUT. Morphologisch-funktionelle Untersuchungen über die Feinstruktur der Vogelfeder. Journ. f. Ornith., 85: 206-372, 96 text-figs., 1937.—An elaborate paper on the microscopic structure of the barbs and barbules of the primary feathers particularly, in various birds, with many outline figures showing the characteristic differences found, with an excellent bibliography. The tips of the

radii are especially modified in the areas of contact of the wing and tail feathers which bear upon one another in flight. The genus *Turdus* shows a somewhat generalized condition and various more complex types of structure are illustrated, culminating in the owls in which the tips of the radii are diffuse and long, correlated with their silent flight; a somewhat similar condition is found in goatsuckers.

SITS, ERIK. Die Invasion der Schnee-Eule in Eesti (Estland) im Winter 1935-36.

*Ornis Fennica*, **14**: 36-37, March 1937.—An account of a Snowy Owl invasion in Estland, Finland, in the winter of 1935-36 is described and the localities where specimens were recorded are plotted on a map. The birds appeared first at the end of October, then were not noted again for about a month, after which they were generally distributed until about January 29. After this time only a few were seen, the last one noted at about the 22d of March.

STEGMANN, B. Die Nasendrüsen von *Charadrius asiaticus* und *Charadrius veredus*.

*Ornith. Monatsber.*, **45**: 80-81, May 2, 1937.—These two Asiatic plovers differ notably in the size of the nasal gland and its consequent influence on the magnitude of the bony area in which it is lodged. They have at various times been regarded as subspecies one of the other, as two different species, or even as forms of two different genera. The author shows that the enlargement of the nasal glands in *C. asiaticus* is associated with its greater predilection for salt water.

STEINFATT, OTTO. Aus dem Leben des Grossbuntspechtes. *Beitr. z. Fortpflanzungs-biol. d. Vögel*, **13**: 101-113, May 1937.—A continuation of the paper on

life history of the Great Spotted Woodpecker in Germany. On account of the warmth retained by the nest cavity, the young of this and other hole-nesting species were found to be left for considerable periods without being brooded by the parents. Notes on the voice of the young and their feeding by the old birds are given. In the cases observed, the female feeds the young about a third or a quarter more times than the male. Details are given of the relation of activity to weather conditions and of the amount of food brought to the young. A table is given showing for this and other hole-nesting species the number of days required for the eggs to hatch and for the young to remain in the nest, from which it appears that in this woodpecker, the incubation period is twelve days and the young do not leave the nest until from 21 to 23 days old.

STEINIGER, FRITZ. "Ekelgeschmack" und visuelle Anpassung (einiger Fütterungs-

versuche an Vögeln). *Zeitschr. f. Wiss. Zool., sect. A*, **149**: 221-257, Mar. 1937.—Experiments are detailed in which tame cagebirds of common insectivorous species in Germany were offered various insects which are supposed to escape being preyed upon by birds because of unpleasant taste or protective mimicry. Ants (*Formica rufa*) offered to Redbreasts, Bluethroats, Garden Warblers were taken exceptionally or not at all, but Gray Flycatchers and Chinese Sunbirds liked them, but have the peculiar habit of wiping them on the feathers of the back or tail before swallowing them. Similar habits have been recorded of other birds when eating insects of strong taste. Most birds will eat a certain syrphid fly in spite of its supposed resemblance to a wasp. Ladybirds were eaten occasionally by a Gray Flycatcher. A twig-mimicking caterpillar (*Biston*) was frequently overlooked by a Redbreast. In an hour it found more of these when they were on leaves than when they were stretched out in a twig-simulating position. On the other hand, this device was no protection against Blue Tits, while a Gray Flycatcher paid no attention to such caterpillars. One geometer reacted by dropping on a silk thread several centimeters and was then passed by not only by the Blue Tits but by Redbreasts and Chaffinches. Experiments with a counter-shaded

caterpillar showed no evidence of the protective value of this coloration. The experiments show that different insectivorous birds differ greatly both specifically and individually in their ability to find and prey upon insects supposedly protected by some device. Such devices may be of value against certain enemies only or under certain circumstances.

STEPHENS, LAURA A. European Goldfinches. *The Gull*, 19: 1, May 1937.—Two small groups of this bird, one of seven and one of five, were seen in Marin County, California, and others were reported in the same region the previous autumn. They are probably the progeny of escaped cagebirds, but no evidence of their introduction was discovered.

STRESEMANN, E. Vögel vom Monte Iliniza (Central-Ecuador). *Ornith. Monatsber.*, 45: 75–77, May 2, 1937.—This paper adds two species to the list of Dr. Chapman of birds of this peak, numbering twenty-four species. These are named as new, *Elaenia aenigma* and *Scytalopus latebricola spillmanni*.

STRESEMANN, E., MEISE, W., AND SCHÖNWETTER, M. Aves Beickianae. Beiträge zur Ornithologie von Nordwest-Kansu nach den Forschungen von Walter Beick (†) in den Jahren 1926–1933. *Journ. f. Ornith.*, 85: 375–576, 1937.—This extensive paper is a memorial to the late Walter Beick, giving an account of his career, and more especially of his extensive exploration and ornithological collecting in the northwesternmost part of China, the Province of Kansu. The large collections he made, were sent to the Berlin Museum and form the basis of the account here given of the avifauna and the ecological conditions under which it lives. Other explorers have made collections in this general region but seldom with the enthusiasm and devotion displayed by this naturalist. The following new races are described from the specimens sent to Berlin: *Cyanopica cyanus kansuensis*, *Mycerobas carnipes nanschanicus*, *Emberiza cioides tangutorum*, *Calandrella rufescens stegmanni*, *Rhopophilus pekinensis beicki*, *Tarsiger cyanurus albocoeruleus*, *Luscinia calliope beicki*, *Troglodytes troglodytes longicilla*. The many field notes and accounts of nests and eggs add much to a knowledge of the birds of this area which lies on the borderland between desert and mountain forest.

TAVERNER, P. A. Birds of the eastern Arctic. Canada's Eastern Arctic, Ottawa, Dept. of the Interior, pp. 113–128, 6 text-figs., 1934.—A convenient résumé of the species of birds found in the Canadian arctic regions and along the northern limit of tree growth. The list includes 113 species of which some 45 are Charadriiformes, 22 Anseriformes, and only 15 Passeriformes. Baird's Sandpiper has a high northern distribution at least to Smith's Sound; the European Golden Plover occurs in northern Baffin Land as a migrant. The specific distinctness of Kumlien's Gull is maintained. The fact that its known breeding areas are far removed from those of Thayer's Gull and the Iceland Gull, seems to preclude the idea that it is a hybrid between them. The arctic areas now most in need of ornithological exploration are the Melville and Boothia peninsulas and the mainland directly south of them. One of the remaining enigmas of the North is the breeding place of Ross's Snow Goose.

TOUT, WILSON. The ducks of Lincoln County, Nebraska. *Publ. North Platte (Nebr.) Bird Club*, no. 3, 16 pp., pl., 1937.—Seventeen species of ducks are here recorded from Lincoln County, while nine others, known from the State, may be expected. Ducks are abundant in the Platte River on migration, and are much shot from blinds on the islands in the main channel. During the past two years two large reservoirs have been made, which already attract numbers of the birds. The Mallard is the commonest species, the Red-legged Black Duck occurs as a rare

migrant, and the Bufflehead, formerly abundant, is now extremely rare. Various notes of occurrence concern the other species listed.

TROLLER, JULIUS. Der Raubwürger, *Lanius excubitor excubitor* L. Der Ornith. Beobachter, L'Ornithologiste, 34: 105-148, Apl. 1937.—From a study of the northern forms of the Gray Shrike, the author concludes that three different groups may be recognized in Eurasia. Only one of these, the group with two white wing-mirrors, has its origin and center of distribution in Eurasia, extending from the Atlantic in a broad belt east to the Pacific in a series of races. The *borealis* one-mirror shrikes of Eurasia on the other hand are of North American origin, and have penetrated by way of Bering Strait to the margin of the area of the first group. The more southern group, *Lanius meridionalis* of southwestern Europe and northwestern Africa, so closely resembles the type of the southern United States that the two can hardly be told apart. The two American types are not closely related to each other. A similar parallel might be drawn in the distribution of the voles of the genus *Pitymys* in Europe and the United States.

VERLAINE, L. L'instinct et l'intelligence chez les oiseaux. VI. Le canard va-t-il à l'eau par instinct? Bull. Soc. Roy. des Sci., Liège, 8: 149-152, Apl. 1937.—To test whether ducklings on hatching seek water instinctively or not, this investigator placed a dozen eggs each of Domestic Duck and Fowl in an incubator, so timing it that all would hatch on the same day. All these young were then loosed together in a garden six meters square with a small pond in the center, around which was a narrow walk, and a ramp by which the young birds could reach the water. He found that the sight of water had no effect on either species, for none showed the least tendency to approach the water when they apparently sighted it a few inches away. But the first chance contact of their feet with the water affected all in the same way for both chicks and ducklings became excited as with pleasure and both entered the water and swam with flapping of wings. The chicks, however, not having so impervious a coat of feathers, had to be gotten out and it took them several days ere they learned not to follow the ducklings into the water, and even these latter must not at first be allowed in too long lest they become water-soaked.

WHISTLER, HUGH, AND KINNEAR, N. B. The Vernay Scientific Survey of the Eastern Ghats (Ornithological section). Journ. Bombay Nat. Hist. Soc., 39: 246-263, Apl. 15, 1937.—Continues the list of birds known from the eastern part of the Indian peninsula, particularly of the Madras Presidency. This installment covers gulls, terns, and shorebirds through the snipe, with critical examination of various more or less questionable records. A new name, *Leucopotius alexandrinus leggei*, is proposed for the form of this plover resident in Ceylon, since it differs from other races in not assuming a distinctive breeding dress. Seven species of snipe of the genus *Capella* are listed with detailed notes of migration.

WITSCHI, EMIL. Effect of gonadotropic and oestrogenic hormones on regenerating feathers of weaver finches (*Pyromelana franciscana*). Proc. Soc. Exp. Biol. Med., 35: 484-489, 4 figs., Dec. 1936.—Except in the breeding season males of the African Orange Weaver Finch are colored like the females. The cock plumage is not determined by testicular hormone since castration does not prevent its appearance. Feathers regenerating in plucked areas of entire and castrated birds of both sexes, treated with gonadotropic hormones were of the cock type. The author concludes that, (1) the hen plumage represents a neutral, basic condition; (2) the cock plumage is induced by a high level of gonadotropic hormone, and (3) the ovarian hormones offset the inductive effects of gonadotropic hormones on the feather type. In the light of such findings, how insecure appear the speculations

of Darwin and successors as to regulation of plumage differentiation by sexual selection.—W. L. M.

WOOD JONES, FREDERIC. The olfactory organ of the Tubinares. *Emu*, **36**: 281-286, pl. 38-41, Apl. 1, 1937.—In this first paper, a general account of the structure of the olfactory region in *Puffinus tenuirostris* is given. A section of the brain shows that in this species (and the same is true of others of the order), the olfactory lobes are relatively large in comparison with most other birds, which suggests that the sense of smell is better developed than usual. It is suggested that this may be correlated with the fact that, as in mammals in which scent glands play an important rôle, there is a strong and characteristic smell in the Tubinares which may play some important part in their habits. While the birds of this group resemble the Pelecaniformes in the articulations of the quadrate they differ profoundly in the highly functional development of the olfactory apparatus.

## CORRESPONDENCE

THE TYPE LOCALITY OF *Psittacus aterrimus*

To the Editor of 'The Auk':—

In Peters's 'Check-list' (vol. 3, p. 171, 1937) this writer considers that the type locality of *Psittacus aterrimus*, as restricted by van Oort in 1911, is Cape York.

This species was described in 1788 and not discovered in Australia till over fifty years later. Edwards's drawing, dated 1761, is the type. This was made by order of the Governor of Ceylon before the east coast of Australia had been discovered. Buffon's reference is from the same plate. Latham is using Parkinson's notes which refer to *Calyptrorhynchus* (as reading them will show). This author proved this when, in 1787, he described the Banksian Cockatoo which "differs from the Ceylonese Black Cockatoo and is probably the same with that mentioned by Mr. Parkinson in his voyage."

This will show that *aterrimus* was not obtained in Australia in the eighteenth century. The part of New Holland known in 1788 certainly did not include the habitat of any form of *aterrimus*. The fantastic statement that a bird may have flown on to Captain Cook's boat can be ignored.

The question arises, is an author allowed a prophetic type locality or must the type locality be governed by the facts at the date of description? Surely the latter interpretation is the only one.

GREGORY M. MATHEWS

Meadway

St. Cross, Winchester

[*Psittacus aterrimus* Gmelin (Syst. Nat., 1, pt. 1, p. 330, 1788) is based on Kakatoës noir of Buffon (Hist. Ois., 6: 97), the Great Black Cockatoo of Edwards's Gleanings, plate 316, and the Black Cockatoo of Latham's Synopsis (1, pt. 1: p. 260, no. 66). Buffon's bird is based on Edwards's plate and granting that Mathews is correct in supposing that Latham's account is based on Parkinson's notes, which relate to another species, brings us back to the fact that Edwards's plate is the sole basis of Gmelin's name.

In the text accompanying the plate, Edwards, after describing the bird, writes: "This figure was taken from a drawing done from the life, of its natural size, by the order of John Gideon Loten, Esq., late Governor of the island of Ceylon, and other Dutch settlements in the East Indies. . . ." The caption to Edwards's plate reads: "The Great Black Cockatoo from the East Indies. After an Original Drawing. George Edwards, Sculp. October. 15 AD 1761."

*Psittacus aterrimus* is the type of the monotypic genus *Probosciger* Kuhl, and is divided into five subspecies distributed over the western Papuan Islands, New Guinea, the Aru Islands and the Cape York Peninsula of Australia. It is quite certain that the original of the plate from which Edwards took his drawing must have come from somewhere in this range and that his figure is a perfectly recognizable plate by which the species may be identified, but of course it must not be relied upon to represent any particular subspecies. A definite restriction of type locality for the typical form is necessary in such a case and Dr. van Oort realizing this, designated the northern part of Australia. This is not as improbable as Mr. Mathews seems to think since the coasts of the northern parts of Australia were known to the Dutch navigators and traders prior even to 1700 and it is entirely possible that the original of the plate copied by Edwards actually did come from Cape York.—JAMES L. PETERS.]

# OBITUARIES

CHARLES HOLCOMB POPENOE (1884-1933), American entomologist, ornithologist, educator, lecturer, was born at Manhattan, Kansas, June 7, 1884, son of Edwin Alonzo Popenoe (a Professor of Entomology in the Kansas State Agricultural College and State Entomologist of Kansas) and Carrie Holcomb Popenoe. He was educated at Washburn College, Topeka, Kansas, and Kansas State Agricultural College (B. S., 1905). He also did post-graduate work at University of Maryland, 1923-25. He was Assistant Entomologist, Virginia Truck Experiment Station, 1907; agent and expert Bureau of Entomology, U. S. Department of Agriculture, 1909, et seq.; also Professor of Entomology, George Washington University, 1927, et seq. He was married to Edith Palmer, July 6, 1931, who, with two children, Charles, Jr., and Peter, survives his death. Possessing a broad knowledge of general natural history and related subjects, he specialized in economic entomology, and in his vocation performed considerable research work in stored-product and mushroom insects. His writings include several Government publications relating to the control of insects that affect vegetable crops, and the use of carbon tetrachloride in fumigation, in the latter of which he was one of the pioneers. He also participated in the determination of the insecticidal value of fatty acids, and at the time of his death was engaged in a special study of atomization of oils and their application in insecticide work. He was a member of American Association for the Advancement of Science (Fellow); American Association of Economic Entomologists; Entomological Society of Washington; Biological Society of Washington; Washington Vivarium Society; American Ornithologists' Union; Mason (Shrine); and Beaver Dam Club. His avocations were horticulture, botany, and aviculture, and of the nine well-recognized species of the genus *Agapornis* he had all except one or two that ever were imported into this country. At the time of his death his private aviary contained thirty-six birds, among which were the following parrots: nine Nyasaland, one Grayhead, two African Red-faces, two Fischer's, one Masked Lovebird, one Yellow-crested Cockatoo, two Double Yellow-headed Parrots, two Australian Yellow Parakeets, and a Conure. He had a keen appreciation of the beauty of flowers, particularly the iris, and had an extensive collection of these plants including several rare varieties. A great lover of books, he accumulated a large and valuable library, particularly on natural history subjects. He died at his home in Silver Spring, Maryland, on November 17, 1933. For further published biographical data see: 'Who's Who in the East,' p. 1664, 1930; 'Who's Who in Nation's Capital,' p. 733, 1933-34; 'American Men of Science,' 3d ed., p. 548, 1921; 4th ed., p. 780, 1927; 5th ed., p. 891, 1933; 'Proceedings' of the Entomological Society of Washington, vol. 36, no. 3, p. 67, portrait, March 1934.—J. S. WADE.

AMOS WILLIAM BUTLER, a Member of the American Ornithologists' Union, died in Indianapolis, August 5, 1937, in the seventy-seventh year of his age. He was born in Brookville, Indiana, October 1, 1860, the son of William Wallace and Hannah Wright Butler and graduated from the University of Indiana in 1894 with the degree of A.B. Later he received the degrees of A.M. in 1900 and LL.D. in 1922 from his alma mater and LL.D. in 1915 from Hanover College.

Butler became an Associate of the A. O. U. in 1885 and was elected a Member in 1901. During the early years of the Union he was very active, particularly in collecting notes on bird migration from observers in his State. His first contribution to 'The Auk,' in July 1888, was devoted to a description of a new subspecies of Savannah

Sparrow (*Ammodramus s. brunnescens*) which he had collected during a visit to the Valley of Mexico in the winter of 1879-80. This name is now regarded as a synonym of the Western Savannah Sparrow (*Passerculus s. alaudinus*). In 1896 and 1897 he was Ornithologist of the Department of Geology and Resources of Indiana. He was a founder of the Indiana Academy of Sciences, serving as secretary for several years and later as vice-president and president; a founder of the Indiana Audubon Society and of the American Society of Mammalogists. He was the leading authority on the distribution of Indiana birds and the results of his work are embodied in his 'Birds of Indiana,' 1891, and in a revised and greatly enlarged edition published in 1898.

At various times Butler was lecturer on economics at Purdue University, lecturer in the Chicago School of Philanthropy and lecturer on public charities in the University of Indiana. His publications on charities and related subjects were numerous and in 1906 he was elected President of the National Conference of Charities and Corrections and in 1910 Chairman of the American Committee on International Prison Congress. For a quarter of a century from 1897 to 1923, he was Secretary of the Indiana Board of State Charities and was as widely known as an authority on certain phases of sociology as he was on the fauna of his native State.—T. S. P.

#### CORRECTIONS

**Correction concerning Zenaida Dove record from Florida.**—On page 400 of 'The Auk,' vol. 36, 1919, in a paper on the birds of Pinellas County, Florida, I recorded two Zenaida Doves as seen at Pass-à-Grille Key, February 11, 1918. At the time that I prepared this paper I had no reference books available, due to being at an army post. I did see a pair of strange doves which, from the meager description as examined at the time, I thought were of this species. I am still at a loss as to what these doves could have been, but in view of the facts about the Zenaida Dove it seems unlikely that they could have been that species. Hence, even at this late date, I should like to withdraw the record.—CLIFFORD H. PANGBURN, *Chappagua, N. Y.*

In 'The Auk,' vol. 53, p. 245, April, 1936, in the notice of the article on "The Stilt Sandpiper on its nesting grounds," the reference "would indicate that these nesting grounds were at Camrose, Alberta, whereas . . . Churchill, Manitoba, was the place of nesting."—FRANK L. FARLEY, *Camrose, Alberta.*

In 'The Auk,' vol. 54, p. 98, January, 1937, the note on "A colony of Western Grebes" should pertain instead to the Eared Grebe (*Colymbus nigricollis californicus*); while the Strawberry Reservoir mentioned is in Wasatch County, 75 miles southeast of Salt Lake City, and not at Logan, Utah.—LYNN GRINER, *State Agricultural College, Logan, Utah.*

In the account of the hybrid between the Black and the Turkey Vulture, in 'The Auk,' vol. 54, p. 384, July, 1937, lines 15 and 16 from the bottom, in place of the words "as were also rear part of the head and neck, and all of the body plumage," read: The rear part of the head and neck were Black Vulture. All of the body plumage was Black Vulture.—E. A. McILHENNY, *Avery Island, Louisiana.*

**THE FIFTY-FIFTH MEETING OF THE A. O. U.**

THE Fifty-fifth Stated Meeting of the American Ornithologists' Union will be held in Charleston, S. C., Nov. 15-18, 1937. The headquarters will be at the Fort Sumter Hotel and the public meetings will be held in the Charleston Museum. Monday will be devoted to business sessions, Tuesday, Wednesday and Thursday to presentation and discussion of papers, and Friday to an excursion. Nine years have elapsed since the Union met in Charleston and it is hoped that those who were unable to attend that meeting will arrange to be present on this occasion. Those who attended the meeting in 1928 will recall the many attractions of Charleston and the cordial hospitality of the local members while others need only be reminded that this is an opportunity which should not be missed of visiting the city made famous in ornithological history as the scene of the work of Catesby, Audubon, Bachman, Brewster, Wayne and a number of other students of birds.

Details regarding the meeting may be obtained from the chairman of the Local Committee, E. Milby Burton, Charleston Museum, but titles of papers should be sent to the Secretary, T. S. Palmer, 1939 Biltmore St., N. W., Washington, D. C., *before* November 1. It is especially requested that persons who contribute papers will submit with their titles an abstract of not more than 200 words and a statement as to the kind of illustrations, if any, and the length of time necessary for the presentation of each paper. To allow ample time for discussion, moving pictures are usually limited to three reels and papers without illustrations to twenty minutes or less.

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TO THE PRESENT TIME  
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## INDEX TO VOL. 54

(New names are in bold-face type)

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